

ROTAX Plus POLE SCAFFOLDING – ASSEMBLY MANUAL

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1.1. Scaffolding overview

ROTAX system scaffoldings are built on a construction grid 3.07 m, 2.57 m, 2.07 m, 1.57 m long and 0.73 m and 1.09 m wide – there is a possibility to expand the grid in all directions. In vertical plane the system's elements can be displaced every 0.5 m. ROTAX scaffolding allows fast and secure realization of spatial structures with complicated shapes. It also allows building large scale platforms, e.g. stages, elevated work platforms, etc. This type of scaffolding can be used as a support or load-bearing structure for different kinds of billboards, stands, camera stations and occasional tribunes placed during cultural and recreational events.

The permissible load of a scaffolding in facade set-up equals 2 kN/m^2 for scaffolding width of 0.73 m and 3 kN/m^2 for scaffolding width of 1.09 m.

Scaffolding construction requires the use of steel, working platforms with permissible load of 3 kN/m^2 to 6 kN/m^2 depending on the length of the platform and its configuration as well as aluminium-plywood and wooden platforms with permissible load of 2 kN/m^2 . Depending on the needs, ROTAX system can use platforms with two kinds of catches:

- cross-bar catch – round (transom), O-type,
- cross-bar catch – U-profile U-type (transom).

Entire scaffolding assembly system is based on the possibilities given by the specific construction node, which allows the connection of cross-bars, stringers, horizontal and vertical braces.

WARNING: WARNING: Criterion no. K/0812-721/1/08 of Institute of Mechanised Construction and Rock Mining - Warsaw (Instytut Mechanizacji Budownictwa i Górnictwa Skalnego w Warszawie) differentiates the concept of a board (single element) and a platform (build of boards). In this manual, according to the apprenticeship, the word PLATFORM will be used in both meanings.

1.2. Norms and regulations regarding scaffoldings

During the design, assembly, disassembly and general use of the scaffoldings, it is crucial to respect all the norms and regulations mentioned in:

This manual.

Regulation of the Minister of Labour and Social Policy of 28 August 2003 establishing general rules for occupational safety and health – consolidated text (Journal of Laws No. 169/03, item 1650), as amended.

Regulation of the Minister of Economy of 30 October 2002 regarding minimal requirements for occupational safety and health as far as the use of machines by workers during working hours (Journal of Laws, No. 191/02, item 1596), as amended.

Regulation of the Minister of Infrastructure of 6 February 2003 regarding occupational safety and health during construction works (Journal of Laws No. 47/03, item 401).

PN-M-47900-1:1996 "Steel, standing working scaffoldings. Definitions, division and main parameters".

PN-M-47900-2:1996 "Steel, standing working scaffoldings. Pole scaffolding made of pipes".

PN-M-47900-3:1996 "Steel, standing working scaffoldings. Frame scaffoldings".

PN-EN 12811-1:2004 "Provisional structures used at a construction site. Scaffoldings. Conditions for the production and general design rules".

PN-EN 12810-1:2004 "Facade scaffolding made of prefabricated elements. Technical specifications of the products".

PN-EN 12810-2:2004 "Facade scaffolding made of prefabricated elements. Particular design and construction methods".

PN-EN 74:2002 "Couplings, centring plungers and foot sets used in working and load-bearing scaffoldings made of steel pipes. Requirements and examination procedures".

PN-EN 39:2003 "Steel pipes for scaffolding construction – Technical regulations for the delivery process".

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1.3. General rules of scaffolding assembly

1.3.1. Before commencing the assembly, the scaffolding ground base needs to be checked. It has to absorb the loads coming from the weight and vertical forces present on the scaffolding. Load-bearing capability of the ground base, on which the scaffolding has been placed, cannot be lower than 10 MPa. Load-bearing capability is established according to PN-81/B-03020. In case of construction bases and base reinforcement, the scaffolding placement should meet the requirements of PN-M-47900-2 section 4.4.

1.3.2. The proper placement of the scaffolding main level requires the use of plumbing jig and 500 g hammer that is used for wedging together separate elements.

1.3.3. Screw footing should be placed on wooden base perpendicular to the wall. At least two footings should be placed on a single wooden base. Threaded plunger in the frame has to inter-operate with a stand's pipe at minimum length of 150 mm.

1.3.4. Install the primary elements on the screw footings. The units of footings and primary elements should be connected with transoms. The transoms act here as stringers and cross-beams.

1.3.5. During assembly, use only fully-fledged elements of scaffolding.

Element's evaluation criteria

Elements with visible signs of damage cannot be used. It is particularly important not to use:

- elements with signs of corrosion localized at the connection areas (welds),
- load-bearing stands with visible damages in the form of pipe twists, section deformation,
- steel planks with damaged sheathing or damaged and bended catches,
- aluminium-plywood platforms with visible damages of plywood sheathing in the form of stratification, cracks, bulges, decrements as well as bended load-bearing platform beams,
- screw footings with damaged threads, twisted plungers or resistive nuts.

Damaged elements should be replaced with the ones in working order. The elements that can be repaired should be handed back for reparation. Element straightening is permissible only when there are no deformations to circular section. It is forbidden to perform repairs on load-bearing elements e.g., stands, braces and footings.

1.3.6. The scaffolding should be placed in such a way that the spacing between the scaffolding and building's facade would not exceed 0.2 m. In case of wider spacing, additional mid and lower railings should be attached on it's internal side, as well as longitudinal curbs that protect the working platform.

1.3.7. Wall scaffolding brace is performed on the external surface of the scaffolding, parallel to the wall's face. The process consists of large-format and tower bracing. Vertical braces should be placed in every fifth bay of the scaffolding net screen, for the bay of 2.57 m, and every fourth for the bay of 3.07 m. At least two braces should be placed counter wise on a single level. Longitudinal transoms should be placed in braced bays. They will act as vertical braces. Spacing between braces should not exceed 10 m.

1.3.8. Stands' bottom opening plates should be buckled crosswise with transoms. Additionally, transverse transom should be attached in a way that the spacing between the transom buckling the primary element and the stand's bottom transom does not exceed 0.5 m.

1.3.9. Extreme ends of the platforms should be secured with transverse transoms. This prevents entering bays without installed platforms.

1.3.10. In the bay where circulation path will be installed, U-transoms ought to be mounted, as well as platforms for vertical communication.

2. Scaffolding assembly

2.1. Basic elements assembly (partial examples)

2.1.1. ROTAX Plus node

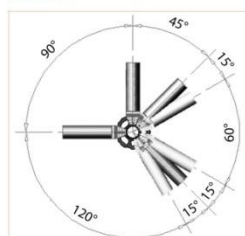


Fig. 2.1a

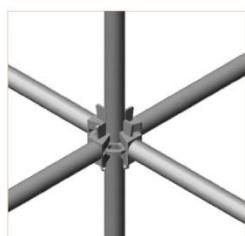


Fig. 2.1b

Type of load	Permissible value
Bending moment $M_{y,R,d}$ (kN/cm)	± 94
Vertical transverse force $V_{z,R,d}$ (kN)	± 29.3
Bending moment $M_{z,R,d}$ (kN/cm)	± 21.8
Horizontal transverse force $V_{y,R,d}$ (kN)	± 9.27
Twisting moment $M_{T,R,d}$ (kN/cm)	± 50.2
Normal force $N_{R,d}$ (kN)	± 29.2

Table 2.1 – Permissible loads for ROTAX Plus node

Fig. 2.1a and 2.1b – ROTAX Plus node.

ROTAX Plus node's anchoring disk is equipped with 8 anchoring sockets allowing the same number of elements to be attached. Sockets are in two shapes: 4 large and 4 small. Elements that can be smoothly adjusted in the range of 30 degrees can be installed in large openings. Installation of elements in small openings allows to easy obtain rectangular scaffolding net screen.

The node allows the connection of main elements: stands, transoms and vertical braces.

Stand's pipe has built-in anchoring discs spaced by 500 mm. It allows gradual placement of working platform and easy way for additional working surfaces to be built-in. Elements assembly is performed by hammering the head's wedge (part of additional element placed inside of the anchoring disc's socket) with 500 g. hammer (see illustration below).

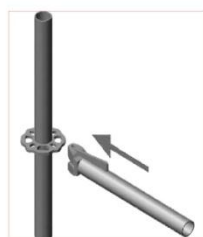


Fig. 2.2a



Fig. 2.2b



Fig. 2.2c



Fig. 2.2d



Fig. 2.2e

Fig. 2.2a, 2.2b and 2.2c – transoms and braces with anchoring disk assembly stages.

Fig. 2.2d and 2.2e – example of node built-in.

2.1.2. Assembly hints for safer use

Personal protective equipment must be used during assembly, disassembly and use of the scaffolding. The following illustrations provide exemplary locations for attachment of the before mentioned equipment, for grater safety of service.



Fig. 2.3 – Attachment location for personal protection equipment

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Assembly manual does not substitute OHS rules at the construction site!
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Fig. 2.4 – Binding to the transom



Fig. 2.5 – Binding to the plate

During scaffolding assembly, personal safety cord must be attached to the facade side of the scaffolding elements. Cord and transom binding must be performed to the transoms that are higher than the level you are standing on. It is also applicable to anchoring plates. When the stands of the assembled level are not bound together, mount the safety cords to the plates at the height of 1 m. It is allowable to attach the cord to the elements of the level you are standing on, but only when there is no other possibility. There are also ways to attach personal protective equipment directly to the structure surrounded by the scaffolding. The way of realization is individual to the structure.

2.1.2.1. Safety Kit

Assembly Safety Kit is a temporal safety precaution for the fitter. It is used during entry to the next level, before posts and transoms are installed. The kit consists of 2 assembly posts and telescopic railing. After the Safety Kit has been installed, the railing can be found one meter above the platform, over the tier where the post is attached. The post can be mounted and dismantled from the level of both tiers. Owing to the telescopic railing, it is possible to relocate the posts onto subsequent levels (without the need of dismantling the railings) and adjust the length of the set in the range of: **1.5 m up to 2.07 m – short version or 2.07 m up to 3.7 m – long version.**

The lightness of the structure makes the set relocation to the next scaffolding level (after the work is finished on the previous level) easy for the fitters.

Assembly stages:

- 1 Assembly post consists of two pipes that can be rotated and moved against joint axis. This allows the catch opening and closing. During proper installation of the post, the bolt in the bottom catch enters the opening in the closing metal plate (Fig. 2.6a).
- 2 Mount the post on the stand by lifting and rotating the external pipe, so the bottom catch leans on the upper railing of the scaffolding (transom) (Fig. 2.6b).
- 3 Mount the telescopic railing in the eye of the post.
- 4 Mount the other end of the telescopic railing in the eye of the post not yet mounted.
- 5 Mount the second post in the same manner as the first (section 2) on the other end of the scaffolding bay.
- 6 After stands and transoms has been mounted on the upper level of the scaffolding, the Safety Kit can be relocated onto subsequent level by opening the railing post's catches and closing them on the higher level. Telescopic railing does not need to be dismantled during this procedure.

2.1.3. Main elements

Scaffolding from the wall point-of-view (Fig. 2.7).

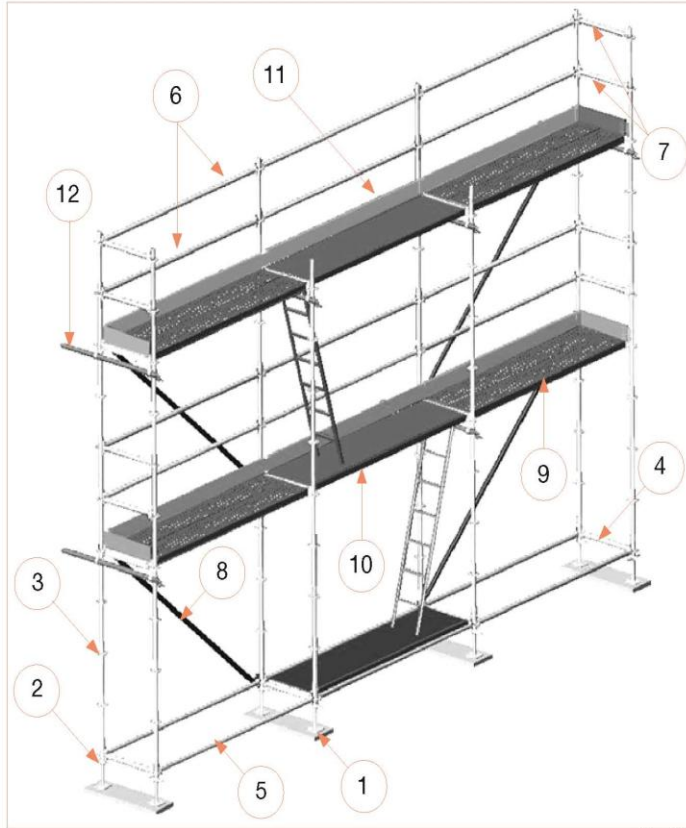


Fig. 2.7

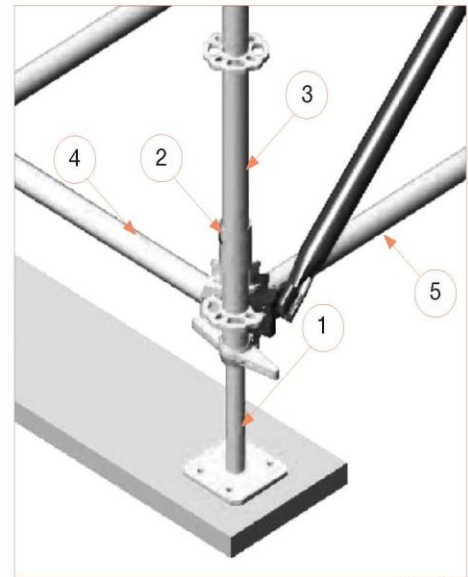


Fig. 2.7a

- | | |
|--|---|
| 1. Steel adjusted footing | 7. Front-end railing (horizontal O-transom) |
| 2. Collar base starter | 8. Vertical brace |
| 3. Vertical standard | 9. Working platform |
| 4. Transverse transom O-type or U-type | 10. Circulation path platform |
| 5. Horizontal O-transom | 11. Curb |
| 6. Longitudinal railing (horizontal O-transom) | 12. Anchoring |

2.1.4. Platform assembly

Platform assembly with U-transom – stages



Fig. 2.8a – Stage 1



Fig. 2.8b – Stage 2



Fig. 2.8c – Stage 3

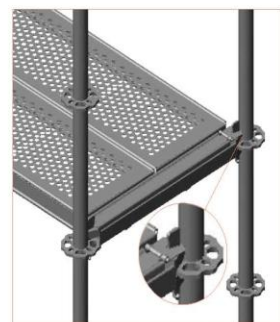


Fig. 2.8d – Stage 4

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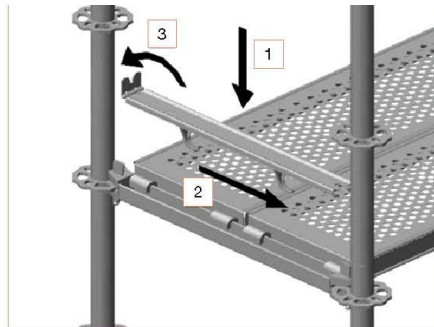


Fig. 2.9 – Example of platform assembly with U-transoms

The platforms (as delivered by the producer) for U-profile assembly are not equipped with safety devices against wind. They are secured with a special element, as shown in the above illustration.

Platform assembly with O-transom

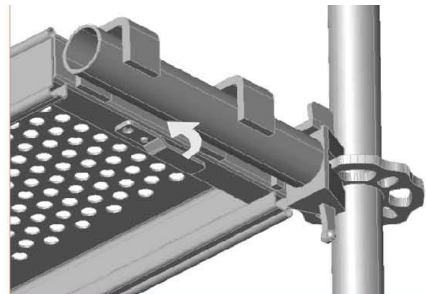


Fig. 2.10 – Example of platform assembly with O-transoms

The platforms (as delivered by the producer) for O-profile assembly are equipped with safety devices against wind. Platforms, when composed into working platform, are protected from de-latching by rotation of platform's safety device as shown in the illustration above.

2.1.5. Side protections

According to norm requirements, every working and safety platform has to have complete safety measures. Platforms with complete safety measures include main and pass-by railings as well as curbs.



Fig. 2.11 – Example of scaffolding with side protection

Side protections – detailed information:

- a) each working platform must be secured with longitudinal curb and two horizontal transoms (railings) mounted in stand's plates at the distance of 0.5 m or 1 m, measuring from vertical platform;
- b) it is allowed to omit railings and curbs at the building side of the platform, but only if the gap between the wall and platform's edge does not exceed 0.2 m, and when the platform's height does not exceed 1 m from the ground level;
- c) extreme ends of the scaffolding platform must be secured with transverse curb and transverse railing (horizontal transoms);
- d) it is forbidden to step on the railing;
- e) it is allowable to secure the platform with net screen.

2.1.6. Corner assembly

The system allows simple construction of different kinds of corners. Selected examples of corner construction are presented below.

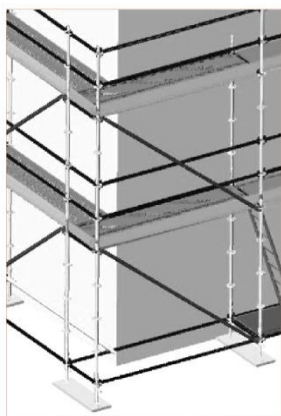


Fig. 2.12 – Corner made with two stands

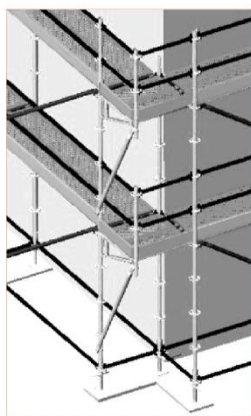


Fig. 2.13 – Corner made with three stands and a bracket

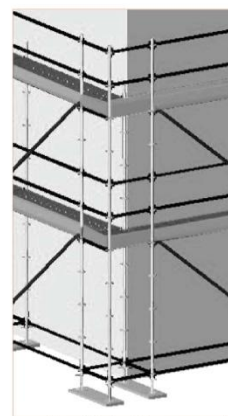


Fig. 2.14 – Corner made with four stands

2.1.7. Expansion brackets

When larger working platform is needed (expansion), the following illustrated examples can be implemented. Exemplary expansion with a 0.36 m and 0.73 m high bracket with transoms and system braces.



Fig. 2.15 – Expansion made with a bracket

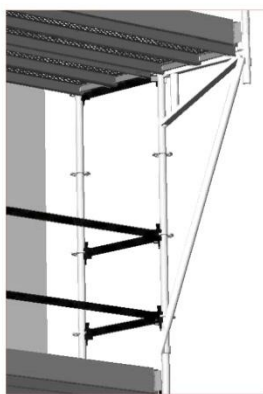


Fig. 2.16 – Expansion made with transoms



Fig. 2.17 – Expansion made with two braces

When constructing expansions with a 0.73 m high bracket, it is crucial to mount supporting brace with the bracket.

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2.1.8. Anchors

During assembly, the scaffoldings should be anchored simultaneously to permanent elements of the building. Anchoring is performed with standard, rotating or longitudinal clamps, wall ties and anchoring screws. Examples of anchoring are presented below.

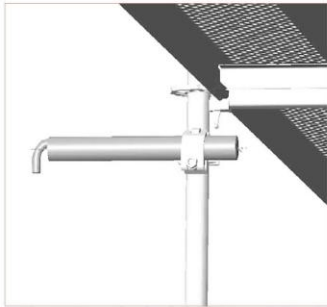


Fig. 2.18a – Anchoring of internal stands with single anchor



Fig. 2.18b – Anchoring of internal stands with V-type anchor

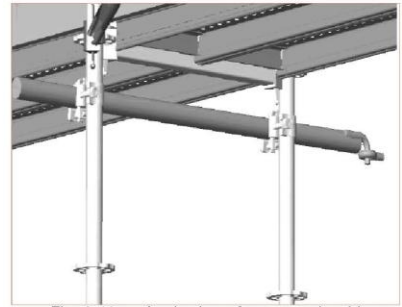


Fig. 2.18c – Anchoring of two stands with one anchor

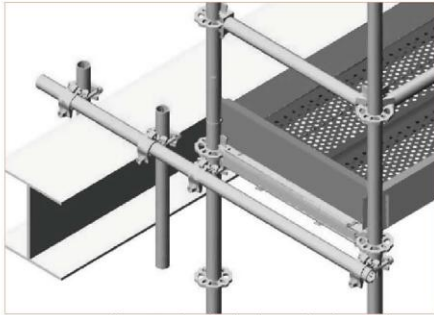


Fig. 2.18d – Anchoring to horizontal beams

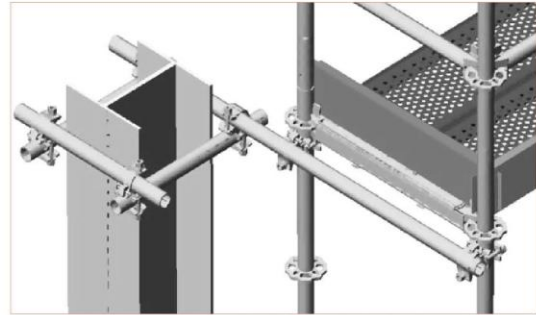


Fig. 2.18e – Anchoring to vertical poles

2.1.9. Span beams – gate crossings

It is often necessary during repair works to construct crossings leading inside the building. Proposed solutions are presented in the illustrations below. The illustrations do not show protective canopy required during crossing's set-up.

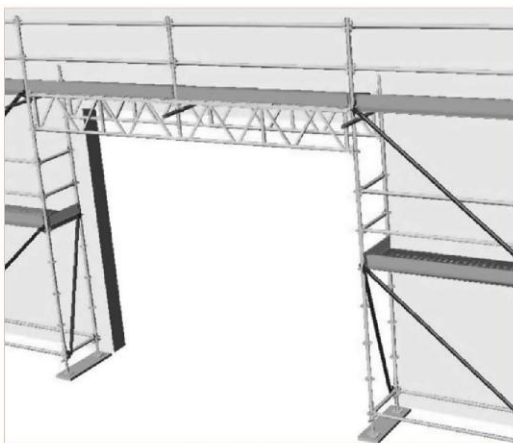


Fig. 2.19 – Gate crossing resting on girders

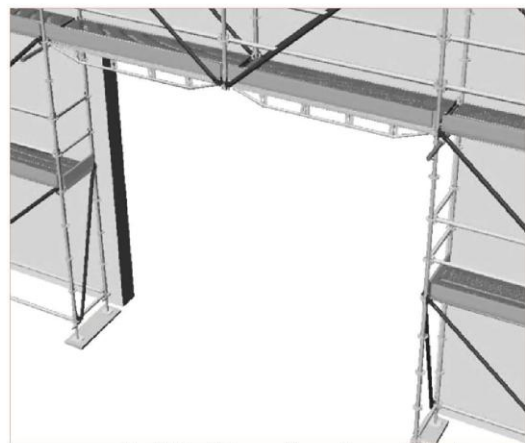


Fig. 2.20 – Gate crossing resting on double transoms

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2.1.10. Pathways beneath scaffoldings

Performing construction/repair works along public sidewalks often requires constructing secured passageways for pedestrians. An example of secured passageway is presented in the illustration below.



Fig. 2.21 – Exemplary pedestrian passageway

System solution must be realized accordingly to scheme presented below. System platforms on the canopy must be attached to U-transoms with steel cord. The scaffolding must be anchored at the level of platforms placed above and below the protective canopy.

Double U-transom Fill with system platforms or planks covered with shock-absorption material that protects against falling objects

Protective roof bracket Pipe connector Vertical standard 2.5 m Collar base starter Steel footing
Fig. 2.1 – Passageway set-up with the use of scaffolding base expansion and roof bracket

2.1.11. Scaffolding entrances

Standard solution for vertical communication on the scaffoldings consists of entrances and passings made with inter-floor ladders or pass-by aluminium platforms – see Fig. 2.22 and 2.23.



Fig. 2.22 – scaffolding entrance with the use of steel inter-floor ladder and overlay transom



Fig. 2.23 – scaffolding entrance with the use of pass-by aluminium platforms equipped with aluminium ladders

2.1.12. Scaffoldings near eaves

When conducting construction/repair works near roof's edge, remember to mount horizontal transoms on vertical stands covering the full height of working platform's level (4 pieces).

Covering the working level stands with net screen or canvas will protect the elements rolling down from the roof from falling outside the scaffolding.

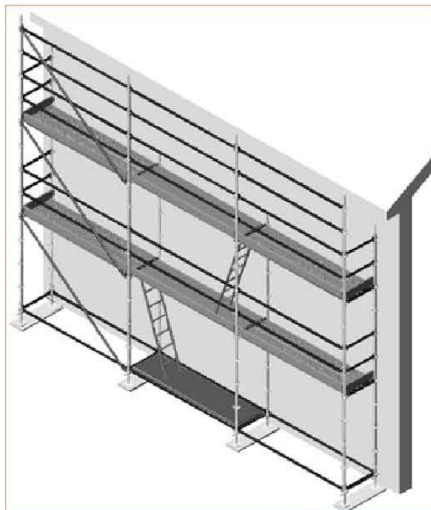


Fig. 2.24 – Example 1

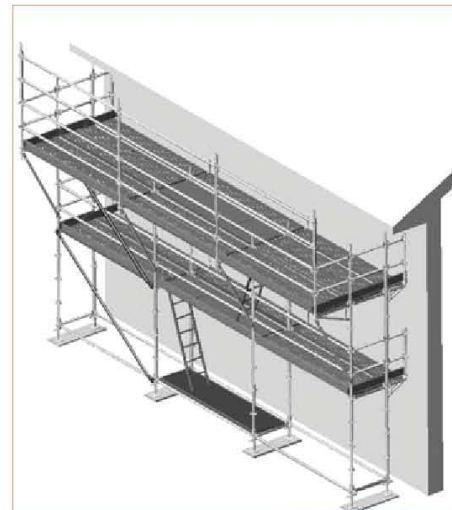


Fig. 2.25 – Example 2

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2.1.13. Openings and scaffolding adjustment

In order to make bypasses of the elements passing through platforms' surface, use transoms applied as shown in the illustrations below.

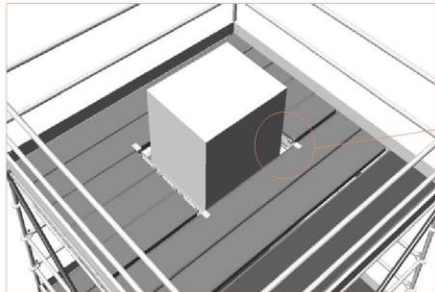


Fig. 2.26

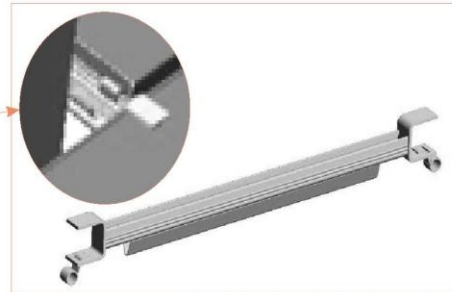


Fig. 2.26a – Overlay transom U-type

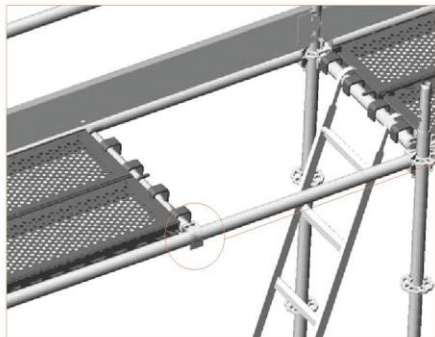


Fig. 2.27

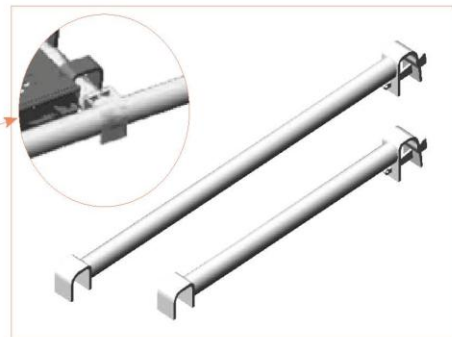


Fig. 2.27a – Overlay transom O-type

2.1.14. Stand spacing change

The change of bay's width with the use of girder pipe connector with fasteners



Fig. 2.28 – Application of girder pipe connector with fasteners

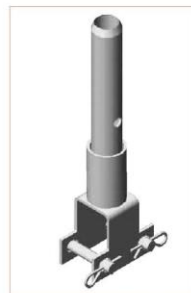


Fig. 2.29 – Girder pipe connector with fasteners

When bypassing ledges, balconies and other architectural elements, it is possible to reduce the width of the scaffolding bay. It is possible owing to girder pipe connector with fasteners, which is a part of ROTAX Plus scaffolding system.

2.1.15. Additional elements

ROTAX Plus system allows safe and secure lining of additional surfaces with wooden elements. Examples of assembly with the use of overlay transom and an "overlap" method are presented below. When using planks for making working platforms, please comply with the guidelines presented in the table below. Please remember that the spacing of supports under the planks cannot exceed 500 mm. It is also important that the gap between planks in butt placement is equal or smaller than 20 mm, and the size of plank overlap is at least 200 mm.

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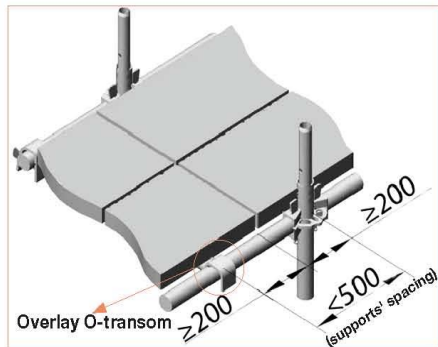


Fig. 2.30 – Butt placement of planks

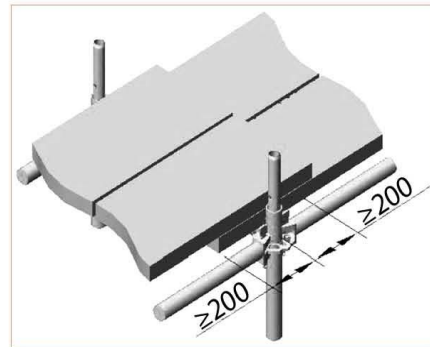


Fig. 2.31 – Overlapping planks

Table 2.2

Permissible span [m] for platforms made of wood or planks (according to table 8, DIN 4420, T1)						
Scaffolding group	Platform or plank width [cm]	Platform or plank thickness [cm]				
		3.00	3.50	4.00	4.50	5.00
1, 2, 3	20	1.25	1.50	1.75	2.25	2.50
	24 and 28	1.25	1.75	2.25	2.50	2.75
4	20	1.25	1.50	1.75	2.25	2.50
	24 and 28	1.25	1.75	2.00	2.25	2.50
5	20, 24, 28	1.25	1.25	1.50	1.75	2.00
6	20, 24, 28	1.00	1.25	1.25	1.50	1.75

2.2. Scaffolding assembly in facade set-up

2.2.1. Scaffolding assembly begins at the lowest area of the ground. Wooden are placed under stands' adjusted footings in spacing determined by the established length of the scaffolding bay. At least two footings should be placed on a single pad.



Fig. 2.32a – Stage 1 – Footing assembly

2.2.2. Place the primary elements on the footings.

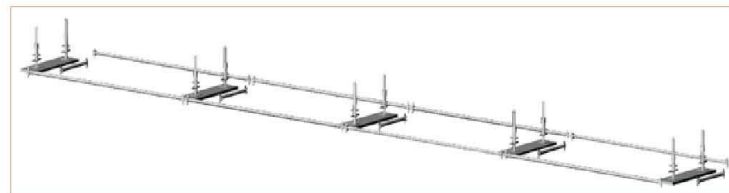


Fig. 2.32b – Stage 2 – Fitting of the primary elements

2.2.3. Clamp the primary footings with cross-beams (horizontal transom - 0.73 m or 1.09 m) and stringers (horizontal transom - 1.57 m, 2.07 m, 2.57 m, 3.07 m) and perform levelling. Assembly is performed by hammering the head's wedge in the opening of primary element's anchoring disc with 500 g. hammer free strike.



Fig. 2.32c – Stage 3 – Clamping of the primary elements

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2.2.4. On the newly prepared basic level stands with proper length are applied. Use basic lengths of the stands, e.g. 2 m or 4 m. In such case, set them up alternatingly: 2 m stand should neighbour 4 m stand.

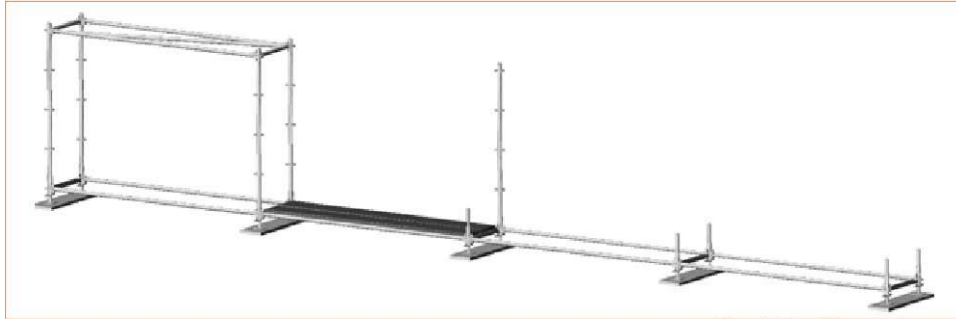


Fig. 2.33 – Mounted stand

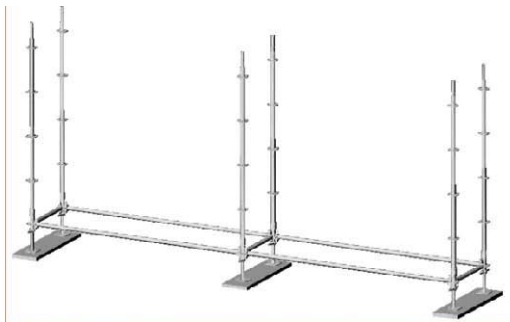


Fig. 2.34 – Usage example of single height stands

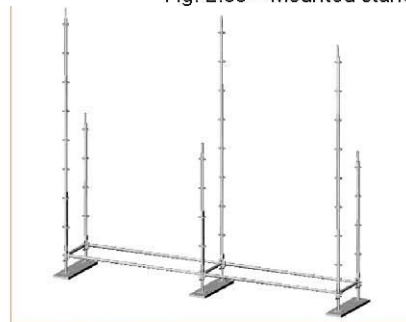


Fig. 2.35 – Usage example of different height stands

2.2.5. At the height of 2 m, measuring from primary element, mount cross-bars, stringers and platforms of circulation path. When assembling higher levels, mount assembly planks as additional platforms. When the scaffolding is low, mount standard platforms. Please remember that, according to the needs, platforms can be attached with pipe-type transom (\varnothing 48 mm) or U-type transom. Each platform should be secured (see Fig. 9 section 2.1.4). bays, where system working platforms are not mounted, should be braced with horizontal brace, in the bays with vertical braces.

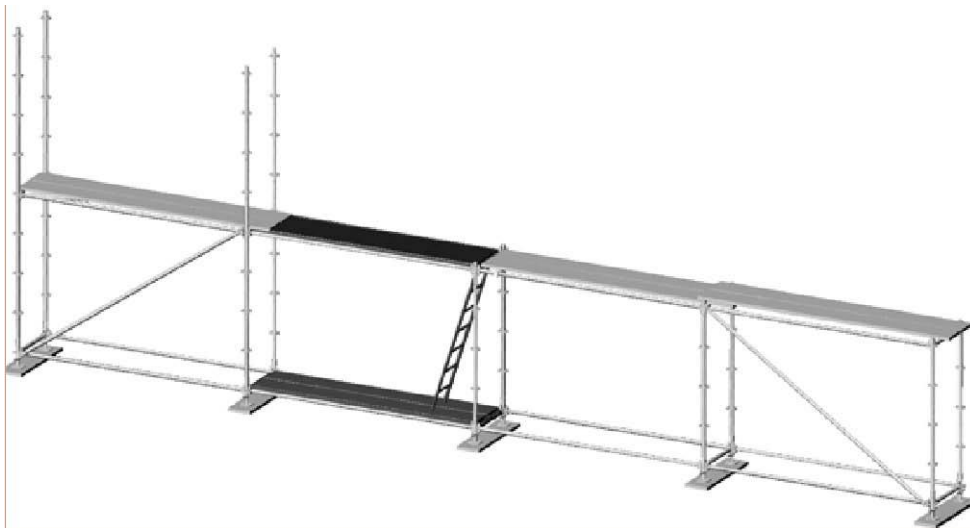


Fig. 2.36 – Illustrated assembly stage

2.2.6. At the height of second platform anchor the scaffolding to the facade with wall ties, normal couplings and anchor eye-bolts. In certain areas of construction grid vertical braces must be mounted. Single level should contain at least two braces. After anchoring the scaffolding, curbs must be mounted on working and safety platforms. It is crucial during assembly to mount horizontal brace in the bays where vertical brace is mounted, but there is no platform.

WARNING: Anchoring must be performed concurrently with scaffolding assembly.

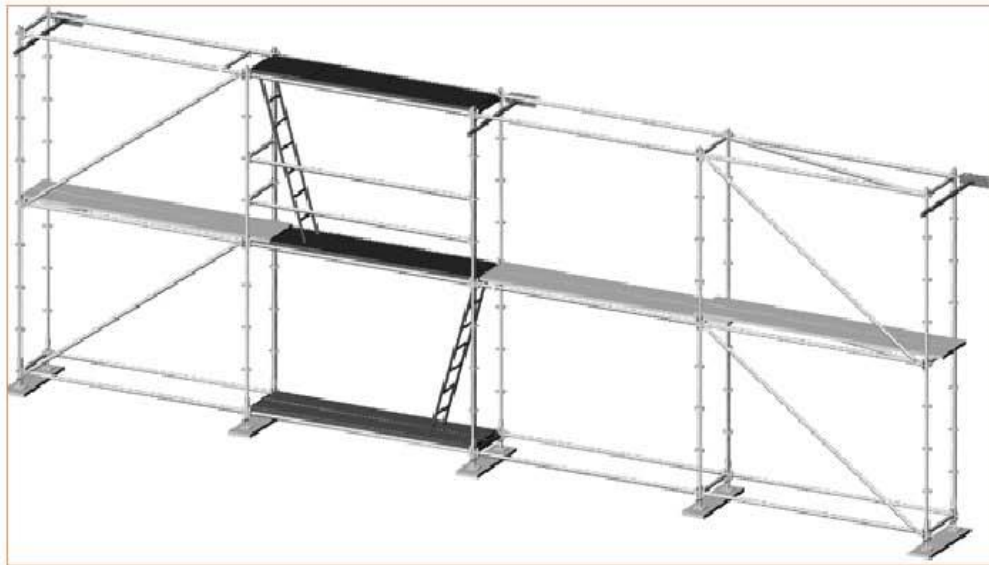


Fig. 2.37 – Example of anchoring the scaffolding to the facade

2.2.7. Protective canopy can be mounted at the height of first platform level. It can be performed by expanding the platform and installing roof brackets as shown in the illustration in section 2.1.10

2.2.8. Cross-bars and stringers of higher level is mounted from the level below. The same rule applies to platform assembly. Before the assembly of platforms for higher level, brace the stands of the currently assembled level.

While mounting all the elements on the stands, please make sure they are properly attached by hammering the head's wedge into the anchoring disc. Wedges should be hammered downwards.

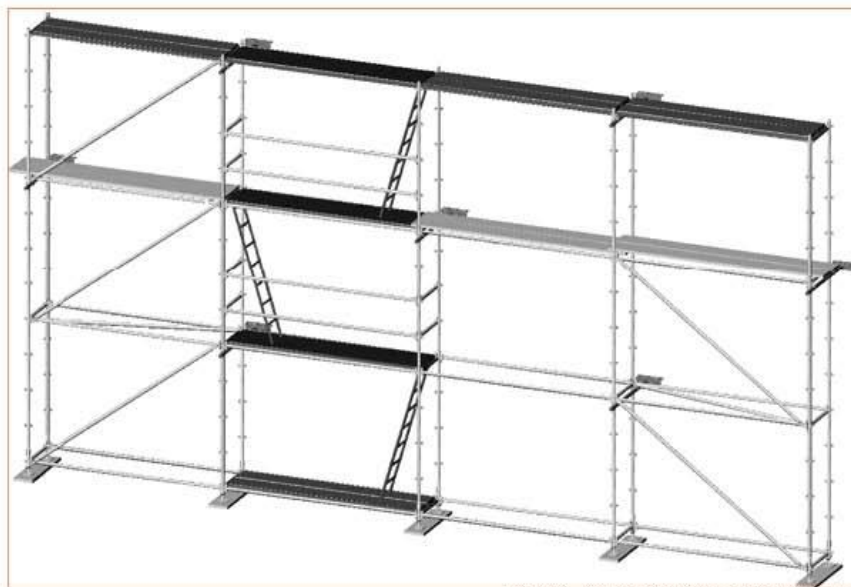


Fig. 2.38 – Scaffolding with mounted platforms

WARNING!

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During stands' assembly, secure the stands from detaching by shifting the safety cotter (pin). Corner connections for stands need to be secured with elastic pin due to collision of the safety cotter with a transverse curb. Avoid connecting the stands outside scaffolding nodes. Working and safety platform has to be secured with curbs and two stringers (horizontal O-transoms) that also act as protective railings.

2.2.9. If the bay requires broadening then it can be achieved by mounting steel, 0.36 m high bracket at the internal side of the

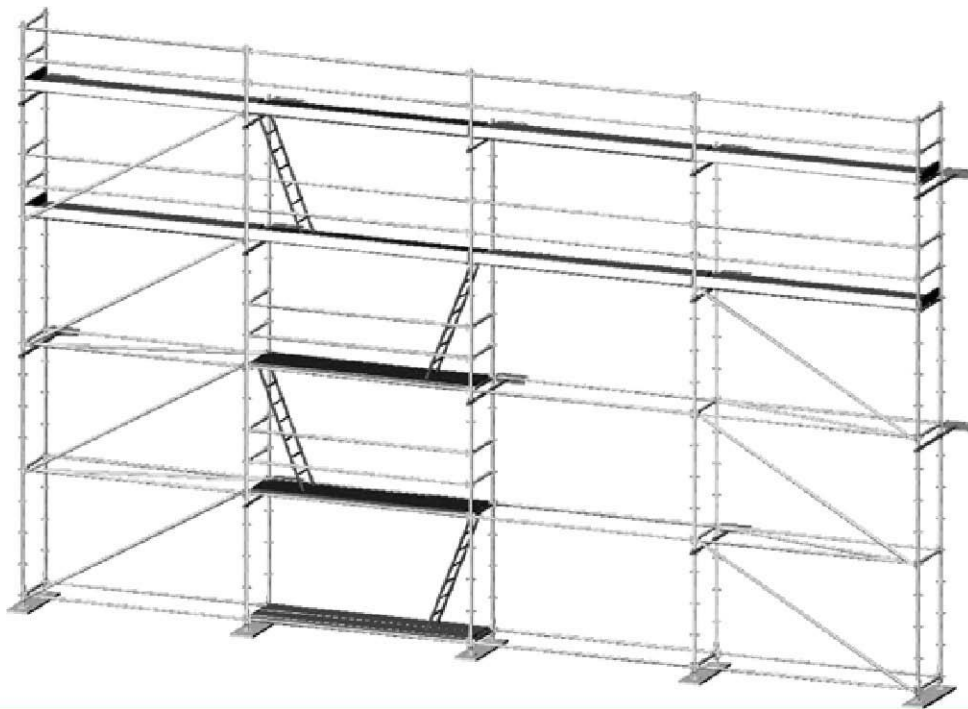


Fig. 2.39 – Working platform secured with curbs and stringers

scaffolding (facade set-up) as well as 0.73 m and 0.36 m high steel bracket at the external side of the scaffolding (facade set-up), as shown in the illustrations in section 2.1.7. Scaffolding broadening from external side is only permissible on one level for entire height of the scaffolding.

When the gap between platforms exceeds **25 mm**, install the filling made of planks. When the gap between platforms exceeds **80 mm**, install horizontal transom or filling made of planks.

2.2.10. Working platform can be lined with wooden beams according to the scheme in section 2.1.15. In such case, follow the data on geometry and span of the wooden beam, as presented in mentioned section.

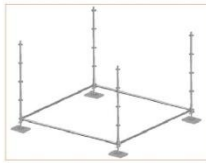
2.2.11. In order to secure the works on the roof, install 2 m high stands and 4 O-transoms on the highest scaffolding level. These will protect the elements rolling down from the roof from falling outside the scaffolding– see section 2.1.12

2.3. Tower scaffolding

This type of scaffolding is commonly used as a supervision scaffolding, or is utilized for simple installation works. It is also used as a support structure for camera station or as a load-bearing structure for speaker sets during events. Scaffolding equipped with castors can act as a mobile scaffolding (rolling). Before assembly, make sure that the ground base's load capability is sufficient.



- 1 Place steel footings accordingly to the desired size.
- 2 Underlay every foot with wooden pad in order to distribute the scaffolding load onto the ground base.
- 3 Install the primary elements on each foot.



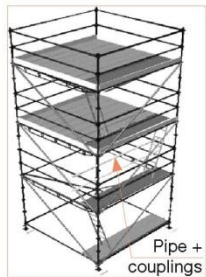
4. Mount horizontal transoms and level the constructed basic frame.
5. Assemble stands.



6. Install the platform in entrance area.
7. Mount O-transoms and double transoms.
8. Brace each wall.
9. Install pass-by, communication platform.



10. Assemble next level of scaffolding as explained in section 5, 6, 7.
11. Install railings in the communication area (internal railing is made of couplings and universal pipes).
12. Assemble next scaffolding level.
13. On main platform and on safety platform install all the remaining platforms, curbs and railings.



During tower scaffolding assembly the following rules must be observed:

- when assembling the scaffolding outside the building, the ratio of scaffolding height H to the smallest dimension of the base B must be equal or smaller than 3;
- when assembling the scaffolding inside the building, the ratio of scaffolding height H to the smallest dimension of the base B must be equal or smaller than 4;

WARNING: Presented set-up examples are non-standard structures, always perform structure safety analysis.

2.4. Load-bearing scaffolding

Spatial, load-bearing scaffolding is a supportive structure that relocates large loads. Load-bearing scaffolding is ideal for supporting ceilings. They are constructed in the same way as tower scaffoldings, with special attention directed into bracing of the structure. Ground-base's load-bearing capability and load distribution from ceilings and supported elements is crucial for this kind of solution. Wooden beams must be placed under each scaffolding footing in order to distribute the load directed at the base. Vertical and horizontal braces play important role in this kind of set-up. Bracing every fifth bay is a minimum number required for such structures. Bracing load distribution should prevent scaffolding net screen from relocating in any direction, which is caused by the load. With this kind of scaffolding utilisation, stands without pilot pipes should be applied on upper raw of the stands.

Loads coming from formwork girders have to be directed centrally onto screw footings with heads. Formwork girders must be secured from collapsing.

Threaded heads, used for supporting wooden girders, are mounted on the upper raw of stands. The heads must be mounted in a way that the threaded screw protrusion was long enough for the heads to be lowered and boarding and scaffolding elements to be disassembled. Screw footings should be unscrewed to the lowest possible height, which allows easy adjustment and later disassembly of the scaffolding.

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Construction manager is responsible for proper scaffolding assembly and inspection!*

ROTAX Plus scaffolding supporting set-up example.

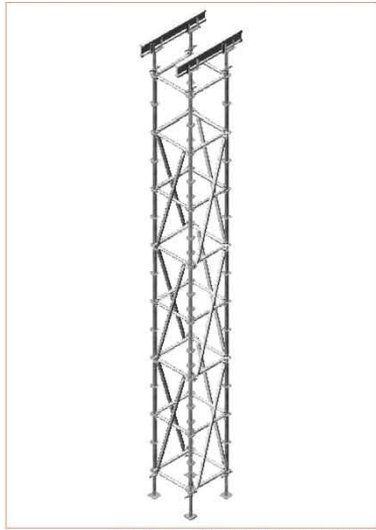


Fig. 2.40 – ROTAX Plus scaffolding in tower set-up

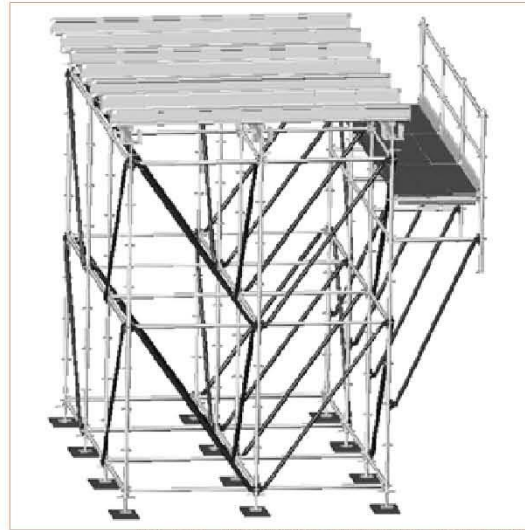


Fig. 2.41 – ROTAX Plus scaffolding in ceiling set-up

WARNING: Presented set-up examples are non-standard structures, always perform structure safety analysis.

2.5. Scaffolding for round objects

ROTAX Plus system can be used with round objects or objects with arch-shaped elements. The node allows variable angle adjustment, which is crucial feature for this solution.

Scaffolding of arched-shaped objects is performed in similar way, and based on the same principles as scaffolding of straight walls. The difference is that particular number of scaffolding bays (distanced evenly) consist of wooden beams or steel planks (trapeze bays), and internal stands in bays filled with wooden beams are connected at the height of platforms with universal pipe and standard clamps.

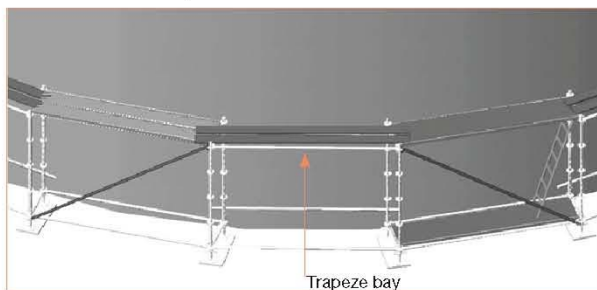


Fig. 2.42

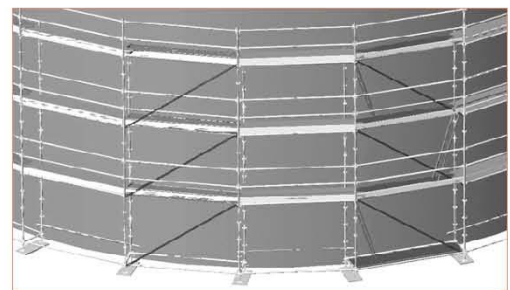


Fig. 2.43

Fig. 2.42 and 2.43 – examples of round object scaffoldings.

WARNING: Presented set-up examples are non-standard structures, always perform structure safety analysis.

2.6. Hanging scaffolding

This type of scaffolding allows limiting the number of scaffoldings, when works are performed at certain height of the building, counting downwards. This solution is particularly useful when possibilities for bridge scaffolding placement are limited or ground's load-bearing capabilities are not sufficient.

Hanging scaffoldings are in multiple forms. Particular solutions can be realized with clamp couplings, chains, rawlplugs or other individual elements.

WARNING!

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When assembling hanging scaffolding, use stands with screwed down pipe coupling for proper stretching force distribution.

At the beginning of scaffolding assembly it is advisable to mount inverted stands. It facilitates mounting of additional, lower stands. Part of scaffolding, overhang, can be assembled on the ground and delivered to mounting spot with a crane. Assembly of this type of scaffolding must be performed in a way that reduces work at heights.

In order to secure the construction works, scaffoldings need to be ballasted. This creates counterweight to planned load on working platforms of the suspended part.

Examples of mobile, hanging scaffoldings, where carrying elements of suspended part are in a form of grate girders, are presented below.

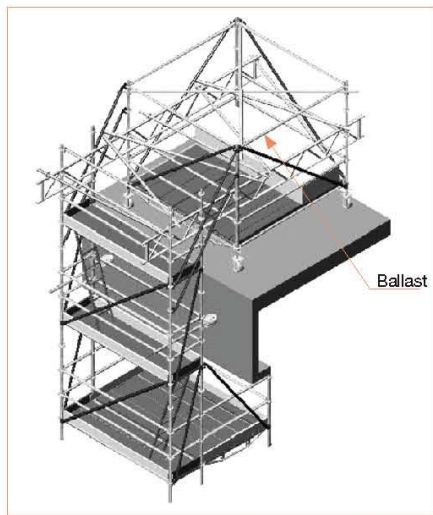


Fig. 2.44

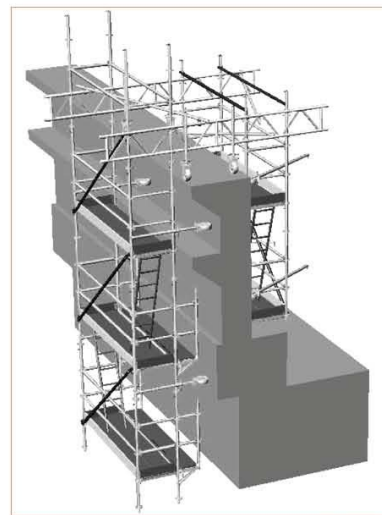


Fig. 2.45

Fig. 2.44 and 2.45 – assembly method for hanging scaffoldings.

WARNING: Presented set-up examples are non-standard structures, always perform structure safety analysis.

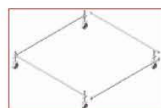
2.7. Mobile scaffolding

During construction, assembly and supervision works in places where scaffoldings can be present only for limited time, mobile (rolling) scaffolding (based on ROTAX Plus system) is a satisfying solution.

Mobile scaffolding is assembled in similar way as ROTAX Plus tower scaffoldings. The basic difference is in presence of castors at the base.

During mobile scaffolding assembly the following rules must be observed:

- when assembling the scaffolding outside the building, the ratio of scaffolding height H to the smallest dimension of the base B must be equal or smaller than 3,
- when assembling the scaffolding inside the building, the ratio of scaffolding height H to the smallest dimension of the base B must be equal or smaller than 4,
- when assembling higher scaffolding, it needs to be anchored to the building,
- after final placement of the scaffolding, castors must be secured with brakes,
- scaffolding must be moved on even and sufficiently strong surface,
- when rolling mobile scaffoldings, it is forbidden for the workers to stay on the scaffolding or leave tools on it.



1. Attach castors with steel footings.
2. Install primary element on the footings.
3. Mount horizontal transoms.
4. Level the constructed base.

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Construction manager is responsible for proper scaffolding assembly and inspection!*



5. Attach posts to corners.
6. Lock the castor brakes before further assembly.
7. Mount lower platform.
8. Mount double transoms.
9. Mount horizontal transoms.
10. Brace each wall.
11. Mount pass-by platform.
12. Mount stands for assembled level.
13. Mount double transoms.
14. Mount horizontal transoms.
15. Mount internal railings in the circulation path (pipes + standard clamps).
16. Brace each wall.
17. Mount steel planks.
18. Mount pass-by platform.
19. Mount stands, braces, transoms, pass-by platform and steel plank for the next level.
20. Mount safety platform with all the railings and curbs.
21. Mount working platform with all the railings and curbs.

When rolling mobile scaffolding, it is forbidden for the workers to stay on the scaffolding or leave tools and materials on it. Castor brakes must be locked when construction works are performed. Examples of different configurations are presented below.

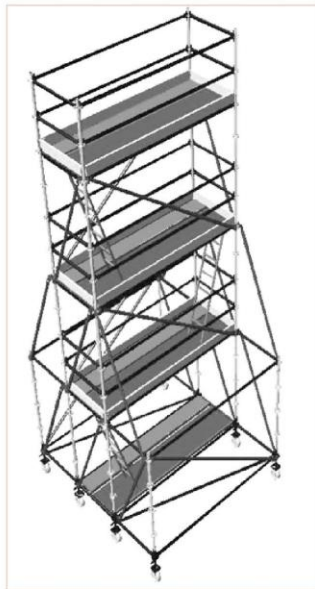


Fig. 2.46

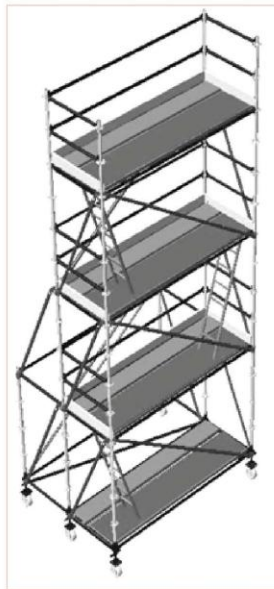


Fig. 2.47

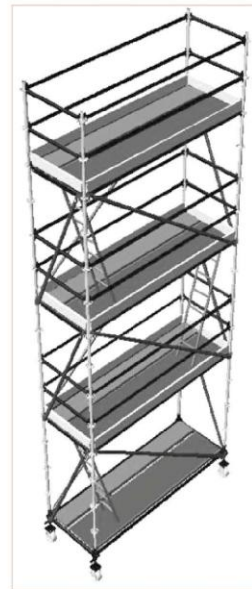


Fig. 2.48

Fig. 2.46, 2.47 and 2.48 – mobile scaffolding in different configurations.

WARNING: Presented set-up examples are non-standard structures, always perform structure safety analysis.

WARNING!

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2.8. External staircases

ROTAX Plus system allows easy and logical assembly of staircases. External staircases allow comfortable and fast vertical movement as well as easy transportation of tools, small devices and materials.

Differential, additional elements for staircase assembly are: aluminium steps, external and internal railings. Remaining elements are available in standard scaffolding set. Examples of staircases are presented below.

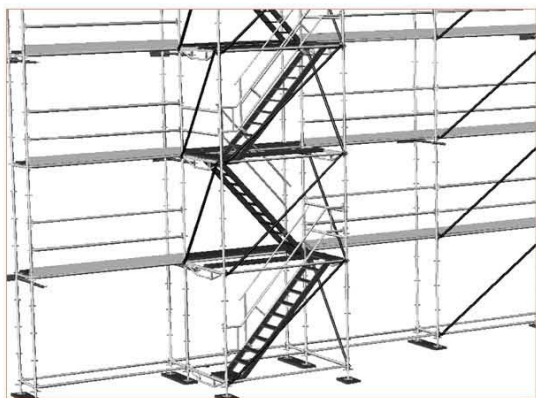


Fig. 2.49 – External, two-landing staircase

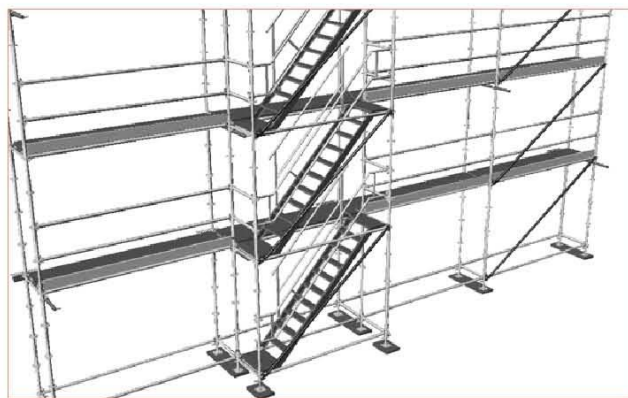


Fig. 2.50 – External, single-landing staircase



Fig. 2.51a – Example 1 - staircase exit



Fig. 2.51b – Example 2 - staircase exit

In example 1, staircase exit leads to expansion of the working platform made with 0.73 m high bracket supported with brace, and steel planks.

In example 2, staircase exit leads onto the working platform, on which (at the staircase area) pipe coupling, post and railings has been installed.

WARNING!

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2.9. Vertical transportation of materials

Essential materials can be delivered onto scaffolding with head block's outrigger, block and winch, e.g. made by GEDA. These elements must be mounted on the scaffolding and anchored as described in chapter 3, section 3.5. Smaller elements can be delivered individually by entering staircases and walking through circulation paths. Mounted winch is presented in the illustration below.



Fig. 2.52 – Scaffolding with a winch

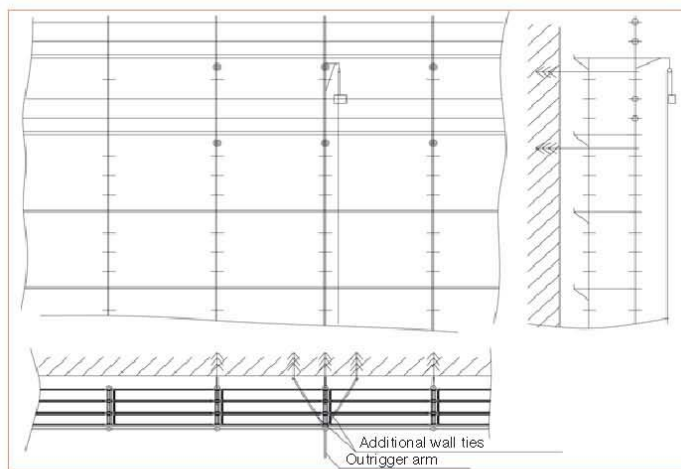


Fig 2.2

WARNING: Additionally, anchor two adjacent stands at each side of the outrigger at the floor level and one above and one below.

2.10. Assembly schemes for typical scaffoldings in facade set-up

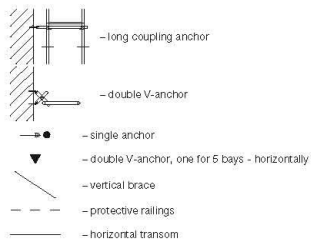
Static proof calculations of illustrated set-up proposals considered the loads that are consistent with HD1000. Set-up proposals with a net screen are compliant with EN 12811:1999. Elements were dimensioned according to PN-B-03200. Force values presented on the schemes below are computational values and consist of safety factors.

WARNING!

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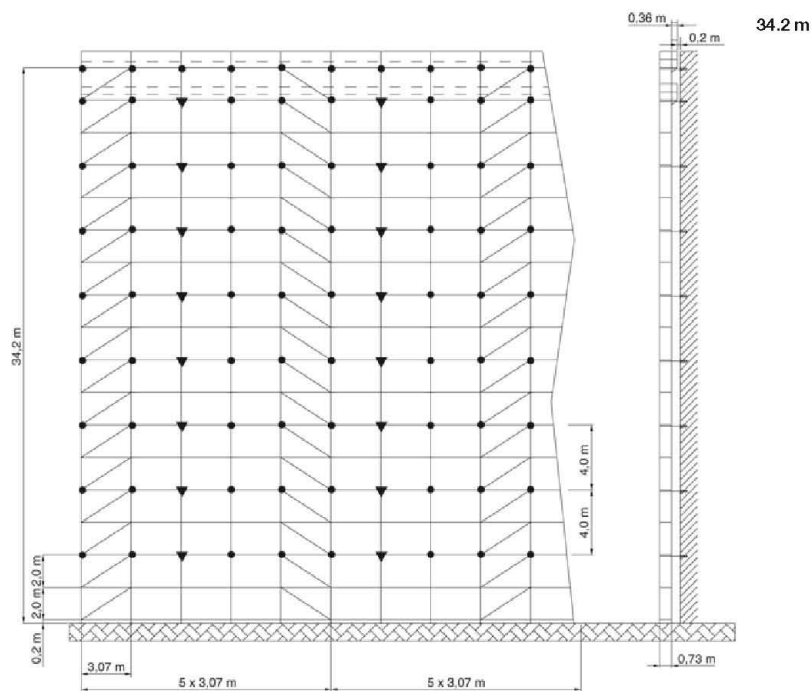
ROTAX Plus POLE SCAFFOLDING – ASSEMBLY MANUAL

Scaffolding without covering, open facade*
 0.36 m high brackets - internal side
 Permissible workload 2 kN/m²
 Permissible level of footing unscrewing 0.2 m

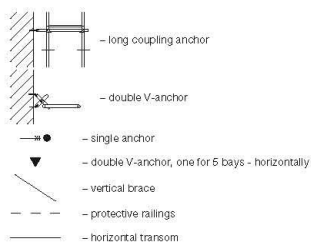


Type of facade filling	open facade		
Vertical anchoring spacing	4 m		
Horizontal anchoring spacing	in each bay		
Maximum force in the anchor (kN)		1.55	01
	⊥	6.92	
Maximum force in the foot (kN)	internal stand	17.1	01
	external stand	17.1	

* closed facade, when number of openings is less than 60% of facade surface

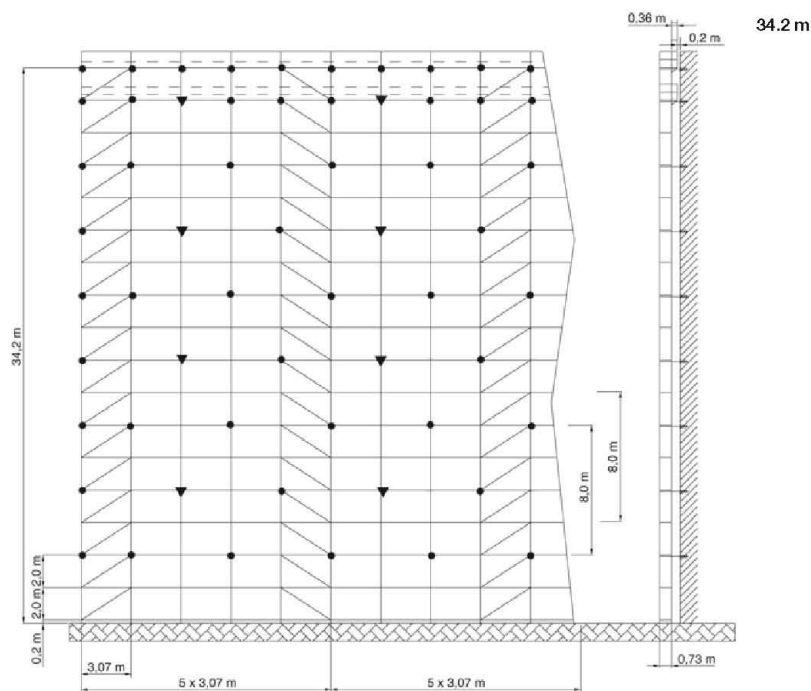


Scaffolding without covering, closed facade*
 0.36 m high brackets - internal side
 Permissible workload 2 kN/m²
 Permissible level of footing unscrewing 0.2 m



Type of facade filling	closed facade		
Vertical anchoring spacing	8 m		
Horizontal anchoring spacing	every second bay		
Maximum force in the anchor (kN)		2.54	02
	⊥	5.66	
Maximum force in the foot (kN)	internal stand	17.4	02
	external stand	17.4	

* closed facade, when number of openings is less than 20% of facade surface



WARNING!

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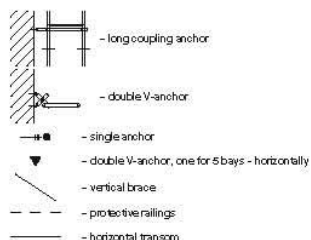
ROTAX Plus POLE SCAFFOLDING – ASSEMBLY MANUAL

Scaffolding without covering, open facade*

0.36 m high brackets - internal side

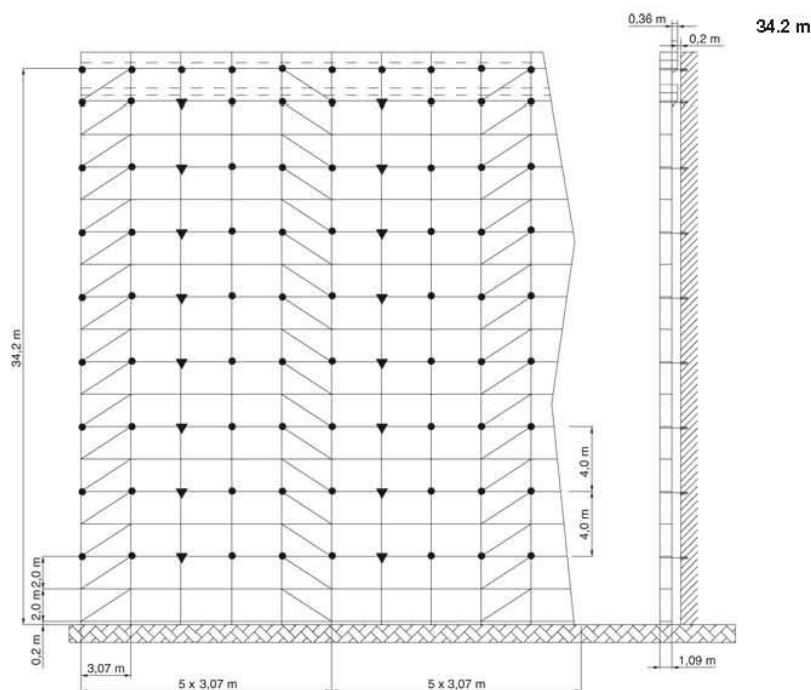
Permissible workload 3 kN/m²

Permissible level of footing unscrewing 0.2 m



Type of facade filling	open facade		
Vertical anchoring spacing	4 m		
Horizontal anchoring spacing	4 m		
Maximum force in the anchor (kN)		1.5	
	⊥	6.73	
Maximum force in the foot (kN)	internal stand	26.9	03
	external stand	26.9	

* open facade, when number of openings is less than 60% of facade surface

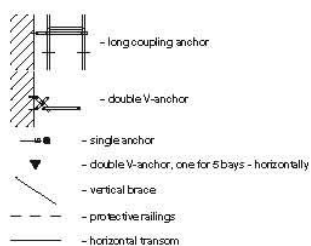


Scaffolding without covering, closed facade*

0.36 m high brackets - internal side

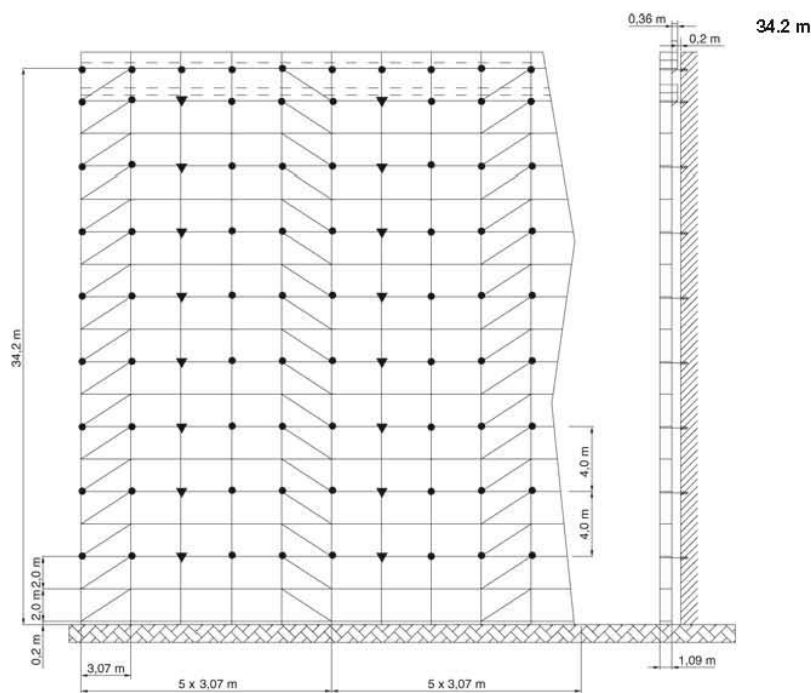
Permissible workload 2 kN/m²

Permissible level of footing unscrewing 0.2 m



Type of facade filling	closed facade		
Vertical anchoring spacing	4 m		
Horizontal anchoring spacing	in each bay		
Maximum force in the anchor (kN)		1.5	
	⊥	3.34	
Maximum force in the foot (kN)	internal stand	26.9	04
	external stand	26.9	

* closed facade, when number of openings is less than 20% of facade surface



WARNING!

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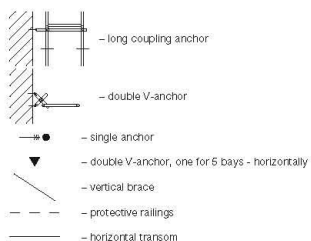
ROTAX Plus POLE SCAFFOLDING – ASSEMBLY MANUAL

Scaffolding with net screen, closed facade*

0.36 m high brackets - internal side

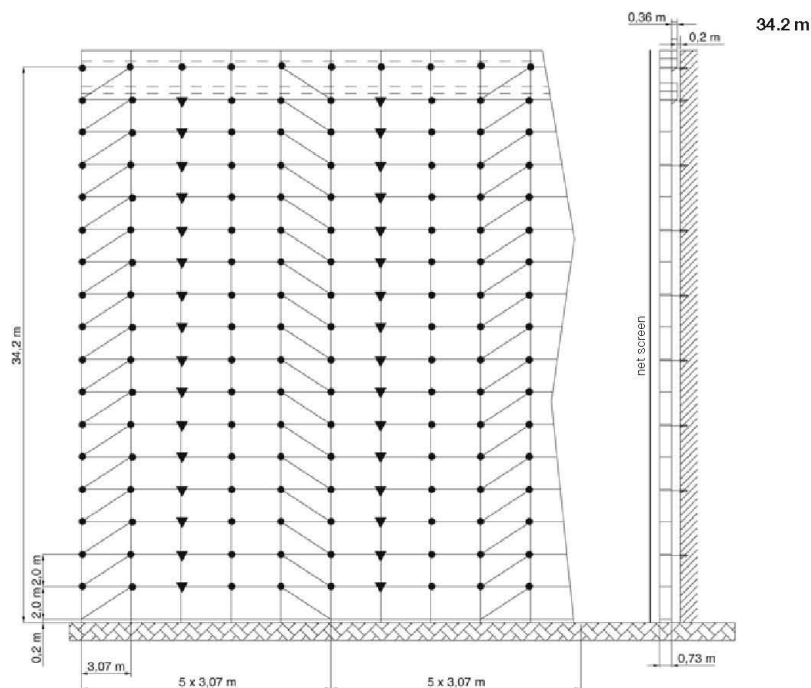
Permissible workload 2 kN/m²

Permissible level of footing unscrewing 0.2 m



Type of facade filling	closed facade		
Vertical anchoring spacing	2 m		
Horizontal anchoring spacing	in each bay		
Maximum force in the anchor (kN)		2.28	05
	⊥	8.86	
Maximum force in the foot (kN)	internal stand	13.6	05
	external stand	13.6	

* closed facade, when number of openings is less than 20% of facade surface

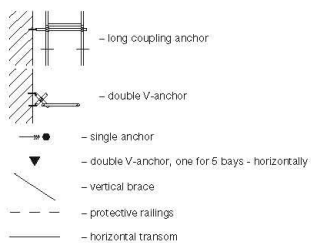


Scaffolding with net screen, closed facade*

0.36 m high brackets - internal side

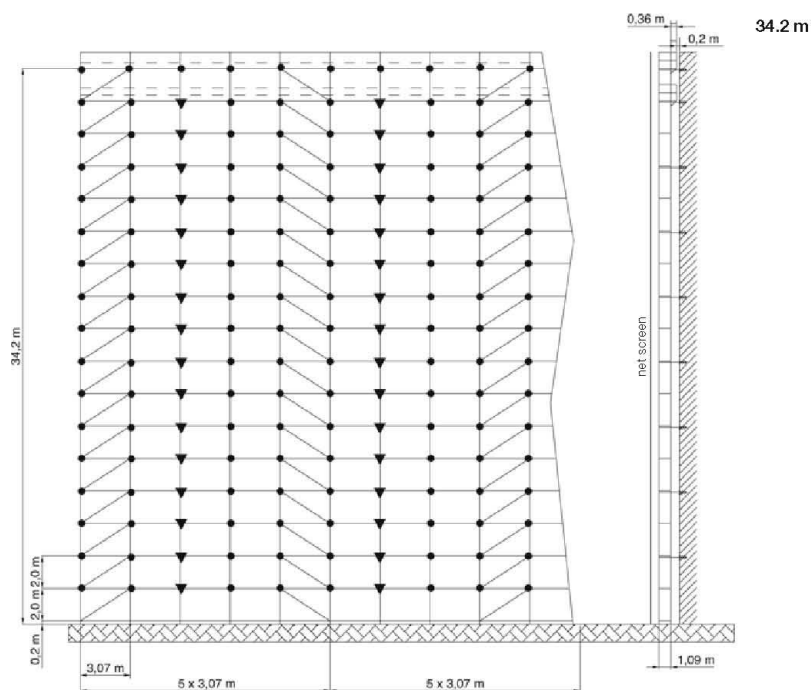
Permissible workload 3 kN/m²

Permissible level of footing unscrewing 0.2 m



Type of facade filling	closed facade		
Vertical anchoring spacing	2 m		
Horizontal anchoring spacing	in each bay		
Maximum force in the anchor (kN)		2.32	06
	⊥	9.98	
Maximum force in the foot (kN)	internal stand	25.4	06
	external stand	25.4	

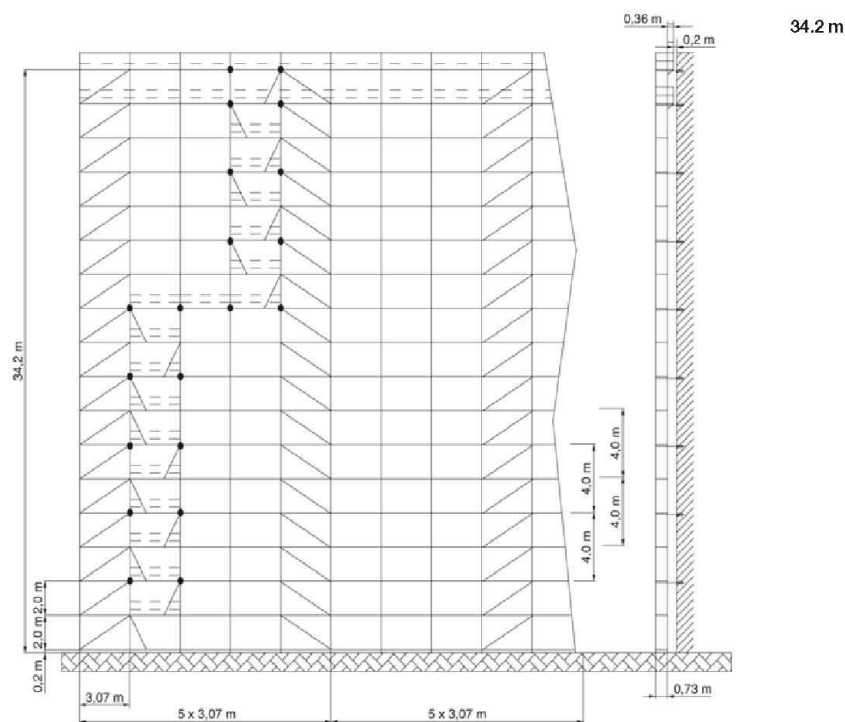
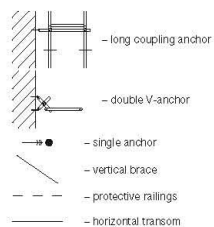
* closed facade, when number of openings is less than 20% of facade surface



WARNING!

Assembly manual does not substitute OHS rules at the construction site!
Construction manager is responsible for proper scaffolding assembly and inspection!

Circulation path anchoring scheme



WARNING!

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ROTAX Plus POLE SCAFFOLDING – ASSEMBLY MANUAL

3. General requirements and safety rules during scaffolding assembly and use

3.1. All the workers hired for scaffolding assembly and disassembly should be trained for specific scaffolding assembly and be authorized by training centres approved by Instytut Mechanizacji Budownictwa i Górnictwa Skalnego w Warszawie (Institute of Mechanised Construction and Rock Mining - Warsaw). During assembly and disassembly of scaffolding, danger zone must be established and secured with proper markings and railings placed at the minimum height of 1.5 m. Danger zone cannot be smaller than 1/10 of scaffolding height, and not less than 6 m.

Assembly and disassembly of scaffolding is forbidden:

- a) after sunset, if no proper lighting has been provided;
- b) during heavy fog, rain, snow and sleet;
- c) during storm and wind that exceeds 10 m/s.

It is forbidden to place scaffoldings near overhead power lines, if the scaffolding radial distance from closest power line wires is less than:

- a) 3 m for a power line with maximum rated voltage of 1 kV;
- b) 5 m for a power line with rated voltage between 1 kV and 15 kV;
- c) 10 m for a power line with rated voltage between 15 kV and 30 kV;
- d) 15 m for a power line with rated voltage between 30 kV and 110 kV;
- e) 30 m for a power line with rated voltage above 110 kV.

During assembly and disassembly of scaffoldings underneath overhead power lines or in closer distance than mentioned above, it is necessary to shut the power down. Scaffolding lightning rods Scaffolding structure should be equipped with lightning rods according to PN-M-47900-2:1996 "Standing, steel made, working scaffoldings. Pole scaffolding made of pipes", section 4.8. "Scaffolding lightning rods".

3.3. The use of scaffolding is permissible only after scaffolding commissioning substantiated with a signature in construction logbook or with commission report, accordingly to regulations. **3.4.**

Scaffolding load-bearing capabilities must be placed on information board attached to scaffolding. Loading the scaffolding with materials above its load-bearing capabilities as well as worker gatherings on platforms is forbidden.

3.5. Scaffolding can be equipped with material transportation tool with outriggers attached to scaffolding structure. Outriggers can be made of pipes attached to scaffolding with couplings. A standard, factory delivered block (e552100) can also be used.

Maximum weight of lifted materials cannot exceed 150 kg. When using scaffolding attached hoists with larger load capacities, static proof calculations must be performed for the scaffolding. Transport outrigger must be additionally anchored in at least two places.

The spacing between outriggers must not exceed 30 m. The distance from collective axis to the furthest point of scaffolding (in lifting plane) should not exceed 0.5 m. The height from block's point of attachment to the level of the platform cannot be smaller than 1.6 m.

For vertical transport it is advisable to use winches adapted for scaffoldings, e.g. winches made by GEDA. The device must have UDT (Office of Technical Inspection) commissioning certificate. Winch assembly must be performed only

as directed by user manual.

3.6. Each scaffolding must be equipped with circulation paths. Circulation paths must be made simultaneously with scaffolding assembly. The spacing between circulation paths cannot exceed 40 m. The distance from circulation path to furthest work place cannot exceed 20 m.

Circulation paths are made inside the scaffolding by mounting aluminium platforms with entry hatch, aluminium ladder and steel planks with entry hatch.

3.7. Scaffolding can be placed in wind zone I and II according to PN-77/B-02011, as illustrated on the map.

Scaffoldings made to be used in wind zone IIa, IIb and III must undergo additional analyses with static proof calculations for the wind.

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Fig. 3.1 – Wind load map according to PN-77/B-02011

3.8. All scaffolding pipe elements' connections must be made with standard and rotary coupling. Rotary and normal coupling must be screwed with a screw tightening torque of 50 Nm.

3.9. Scaffolding must be placed on hardened basis. Otherwise, use wooden pads (one pad for two footings).

3.10. Scaffolding disassembly can be performed after all the construction works (performed from the scaffolding) are

finished
and all working platforms, tools and materials are removed.

Partial disassembly of the upper part (along work progress) is allowable. It is forbidden during disassembly to cast down elements from heights. After disassembly, all elements should be cleaned, checked and segregated if some need to be fixed or replaced.

3.11. Each scaffolding, after assembly and before its use, must undergo operational tests. The tests should be performed each time the assembly works are completed according to PN-M-47900-2:1996 "Standing, steel made, working scaffoldings. Pole scaffolding made of pipes", section 7.3. „*Assembled scaffolding test at the user's site*". The test must be concluded with a report.

3.12. During its use, the scaffolding undergoes the following inspections:

- a) everyday inspection performed by scaffolding foreman;
- b) decade inspections (every 10 days) performed by scaffolding maintenance technician or engineering/technical worker;
- c) ad hoc inspections performed by the commission including construction manager, certified construction professional and

a foreman. Ad hoc inspections are inspections performed after heavy rains, lightning strikes, strong winds, ground tremors, etc. (environmental phenomena).

During inspection the following must be checked:

- condition of security measures (railings, curbs),
- condition of platforms (gaps between platforms, damages, loads on the platforms), circulation paths (ladder attachment, entry latch performance),
- condition of winches and supportive structure,
- security measures against falling of the upper platforms and platforms installed on brackets,
- condition of rotary couplings,
- condition of scaffolding ground base,
- anchoring strength,
- condition of lightning rods.

Inspection results must be logged in construction logbook.

3.13. Steel planks must be assembled in a way that the gap between two elements of the scaffolding would not exceed 25 mm. When assembling working platform's expansion brackets, longitudinal transom must be mounted at the height of platforms in order to fill the gap. It may also be filled with wooden planks.

3.14. It is allowable to expand scaffolding platforms with cross-bars (transoms) and stands supported by vertical braces. Platform expansion can be performed on external side of the scaffolding, on its last level, or on any level with obligatory anchoring of the extension to the wall and to one level above and below.

3.15. When placing loads on the scaffolding platforms, the following hints and rules must be obeyed:

a) actual working weight on the platform consist of total value of individual weights on different spaces. Thus, it is important to avoid accumulating loads in one area of the scaffolding;

b) platform load must be placed evenly on its entire surface;

c) each worker is an equivalent of 0.8 kN (80 kg);

d) when there is an element with certain weight being delivered with a hoist onto scaffolding, then the weight of the element needed for platform load calculation must be increased with modulus 1.2; e) avoid dynamic loads on the platform, e.g. jumping, throwing weights, etc.; f) platforms mounted on brackets must be in the same load group as standard scaffolding platforms.

3.16. Every scaffolding structure has to have at least two platforms: Working platform and safety platform placed directly on the level below according to PN-M-47900-2:1996.

3.17. The rules for scaffoldings, measuring max height of $H = 34$ m, introduced in this manual regard to the scaffoldings which length does not exceed 10 m. The scaffolding longer than 10 m must be treated as non-standard scaffolding, which requires individual design.

3.18. Net screens and canvases are used to protect workers from objects falling down from scaffolding.

3.19. Scaffolding placed adjacent to the public road must be equipped with protective canopy recognized by Regulation of the Minister of Infrastructure of 6 February 2003 regarding occupational safety and health during construction works (Journal of Laws No. 47, item 401).

3.20. Stands placed near gates, clearances and crossings with car traffic, must be secured with roll-stops not connected to scaffolding structure.

3.21. The area, where assembly and disassembly works takes place, must be marked with visibly placed information boards mounted at the height of 2.5 m measuring from the ground level. Signs on the boards must be visible from a distance of at least 10 m.

3.22. If a crossing was rendered inactive during scaffolding assembly (with proper permission from territorial authority), a barrier must be placed at the crossing and a red information board with a warning sign about the crossing being inactive. Red light must be placed at the barrier during night.

3.23. Information board about working platform's permissible load must be placed on scaffolding visible spot.

3.24. When using scaffolding during winter, or during heavy snow – remove the snow from scaffolding before proceeding with work.

3.25. Scaffolding storage and transport must comply with the provisions of PN-M-47900-2:1996 "Standing, steel made, working scaffoldings. Pole scaffolding made of pipes".

3.26. Use only genuine, undamaged system parts during assembly.

3.27. Permissible offset for estimated anchoring places equals 0.2 m. When there is a need to anchor the scaffolding further away from scaffolding node, make individual design for the scaffolding.

WARNING: Maximum bay length for facade set-up scaffolding equals $L = 3.07$ m. This kind of bay requires the use of steel or aluminium platforms. The OHS general rules specific for this branch must be obeyed during scaffolding work.

4. Product marking system

All products made by ALTRAD-Mostostal are certified with ISO 9001. The indicating markings are in the form of permanent imprints 0.7 mm deep and are placed in the areas indicated in technical specification. Additionally, manufacturer and/or client stickers are placed according to individual agreement.

Element marking – cold work mark punch

A 75 XYY – general structure of the mark

A 75 – fixed mark for ALTRAD-Mostostal in Siedlce

X – letter designation for month (changeable mark)

YY – numerical designation for year (changeable mark)

Month symbol - X -		Year symbol - YY -	
A – January	G – July	01 = 1995	07 = 2001
B – February	H – August	02 = 1996	08 = 2002
C – March	I – September	03 = 1997	09 = 2003
D – April	J – October	04 = 1998	10 = 2004
E – May	K – November	05 = 1999
F – June	L – December	06 = 2000	95 = 2099

Additionally, it is possible to punch a mark supplemented with a product acceptance certificate number for domestic markets, e.g. Ü 190, Ü 215, Ü 846, Ü 886, Ü 887. Additional marking is placed at the end of basic marking. Mark placement is specified on products design drawings.






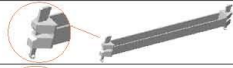





WARNING: There are also elements with AXY and BXY marks.





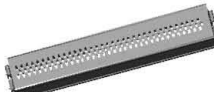
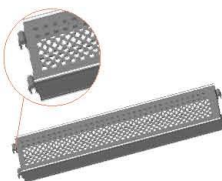
WARNING!

*Assembly manual does not substitute OHS rules at the construction site!
Construction manager is responsible for proper scaffolding assembly and inspection!*

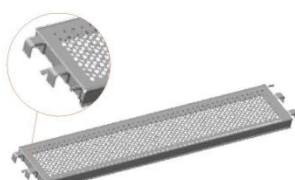

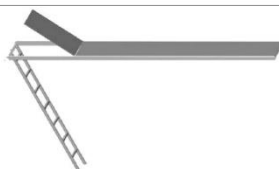
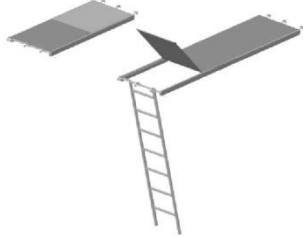

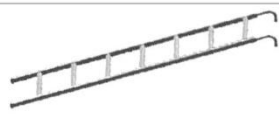
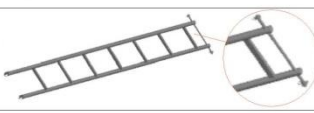
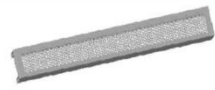
5. Index of ROTAX pole scaffolding elements

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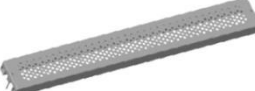
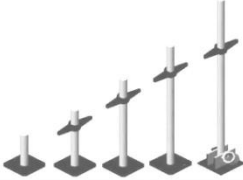




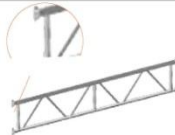
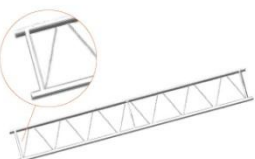
Element name	Index	Weight	
Vertical standard 0.5 m	e371405	3.4	
Vertical standard 1.0 m	e371410	5.5	
Vertical standard 1.5 m	e371415	7.8	
Vertical standard 2.0 m	e371420	10.0	
Vertical standard 2.5 m	e371425	12.3	
Vertical standard 3.0 m	e371430	14.6	
Vertical standard 3.5 m	e371435	17.9	
Vertical standard 4.0 m	e371440	19.1	
Vertical standard 0.5 m without pin coupler	e371505	2.27	
Vertical standard 1.0 m without pin coupler	e371510	4.7	
Vertical standard 1.5 m without pin coupler	e371515	6.7	
Vertical standard 2.0 m without pin coupler	e371520	9.07	
Vertical standard 2.5 m without pin coupler	e371525	11.3	
Vertical standard 3.0 m without pin coupler	e371530	13.6	
Vertical standard 4.0 m without pin coupler	e371540	18.1	
Vertical standard 0.5 m with screwed pin coupler	e371605	4.4	
Vertical standard 1.0 m with screwed pin coupler	e371610	6.7	
Vertical standard 1.5 m with screwed pin coupler	e371615	8.9	
Vertical standard 2.0 m with screwed pin coupler	e371620	11.2	
Vertical standard 2.5 m with screwed pin coupler	e371625	13.5	
Vertical standard 3.0 m with screwed pin coupler	e371630	15.7	
Vertical standard 3.5 m with screwed pin coupler	e371635	19.1	
Vertical standard 4.0 m with screwed pin coupler	e371640	20.3	
Collar base starter L-23	e371300	1.5	
Collar base starter L-43	e371301	2.5	
Steel O-transom 0.36 m	e371803	1.9	
Steel O-transom 0.73 m	e371807	3.4	
Steel O-transom 1.09 m	e371810	4.7	
Steel O-transom 1.57 m	e371815	5.8	
Steel O-transom 2.07 m	e371820	7.4	
Steel O-transom 2.57 m	e371825	9.0	
Steel O-transom 3.07 m	e371830	10.7	
Steel O-transom 4.14 m	e371840	13.9	
Reinforced O-transom, steel 1.09 m	e372210	6.4	
Double steel O-transom 1.57 m	e373615	9.3	
Double steel O-transom 2.07 m	e373620	12.1	
Double steel O-transom 2.57 m	e373625	15.0	
Double steel O-transom 3.07 m	e373630	17.9	
Steel U-transom 0.36 m	e372403	1.9	
Steel U-transom 0.73 m	e372407	3.1	
Reinforced U-transom, steel 1.09 m	e372410	6.1	
Double steel U-transom 1.57 m	e373515	9.7	
Double steel U-transom 2.07 m	e373520	12.6	
Double steel U-transom 2.57 m	e373525	15.6	
Double steel U-transom 3.07 m	e373530	18.6	
Platform protection 0.36 m	e374503	0.6	
Platform protection 0.73 m	e374507	1.3	
Platform protection 1.09 m	e374510	1.9	
Platform protection 1.57 m	e374515	3.0	
Platform protection 2.07 m	e374520	4.0	
Platform protection 2.57 m	e374525	4.9	
Platform protection 3.07 m	e374530	5.8	
Special U-transom 2 platforms	e372507	4.3	
Special U-transom 3 platforms	e372510	7.1	

Element name	Index	Weight	
Overlay O-transom 0.73 m	e372607	4.0	
Overlay O-transom 1.09 m	e372610	5.4	
Wooden curb 0.73 m	e375107	2.3	
Wooden curb 1.09 m	e375110	3.2	
Wooden curb fire-resistant 1.57 m	e375115	4.4	
Wooden curb fire resistant 2.07 m	e375120	5.7	
Wooden curb fire-resistant 2.57 m	e375125	6.9	
Wooden curb fire-resistant 3.07 m	e375130	8.1	
Vertical brace 0.73 x 2.0 m	e373107	8.2	
Vertical brace 1.09 x 2.0 m	e373110	8.6	
Vertical brace 1.57 x 2.0 m	e373115	9.4	
Vertical brace 2.07 x 2.0 m	e373120	10.4	
Vertical brace 2.57 x 2.0 m	e373125	11.5	
Vertical brace 3.07 x 2.0 m	e373130	12.7	
Vertical brace 1.57 x 1.0 m	e373215	7.1	
Vertical brace 2.07 x 1.0 m	e373220	8.4	
Vertical brace 2.57 x 1.0 m	e373225	9.9	
Vertical brace 3.07 x 1.0 m	e373230	11.3	
Horizontal brace 2.07 x 1.09 m	e373320	6.5	
Horizontal brace 2.57 x 1.09 m	e373325	7.7	
Horizontal brace 3.07 x 1.09 m	e373330	9.0	
Horizontal brace 3.07 x 1.57 m	e373331	9.4	
Horizontal brace 2.57 x 0.73 m	e373425	7.4	
Horizontal brace 3.07 x 0.73 m	e373430	8.7	
Steel plank 0.19 x 0.73 m – U	e491807	4.6	
Steel plank 0.19 x 1.09 m – U	e491810	6.5	
Steel plank 0.19 x 1.57 m – U	e491815	9.0	
Steel plank 0.19 x 2.07 m – U	e491820	11.6	
Steel plank 0.19 x 2.57 m – U	e491825	14.3	
Steel plank 0.19 x 3.07 m – U	e491830	16.9	
Steel plank 0.19 x 2.57 m – O	e491925	15.7	
Steel plank 0.32 x 0.73 m – U	e491307	6.0	
Steel plank 0.32 x 1.09 m – U	e491310	8.5	
Steel plank 0.32 x 1.57 m – U	e491315	11.7	
Steel plank 0.32 x 2.07 m – U	e491320	15.1	
Steel plank 0.32 x 2.57 m – U	e491325	18.5	
Steel plank 0.32 x 3.07 m – U	e491330	21.9	
Steel plank 0.32 x 0.73 m – U	e491307c	5.8	
Steel plank 0.32 x 1.09 m – U	e491310c	8.0	
Steel plank 0.32 x 1.57 m – U	e491315c	11.1	
Steel plank 0.32 x 2.07 m – U	e491320c	14.2	
Steel plank 0.32 x 2.57 m – U	e491325c	17.4	
Steel plank 0.32 x 3.07 m – U	e491330c	20.5	
Steel plank 0.32 x 1.57 m – U	e491415	12.1	
Steel plank 0.32 x 2.07 m – U	e491420	15.5	
Steel plank 0.32 x 2.57 m – U	e491425	18.9	
Steel plank 0.32 x 3.07 m – U	e491430	22.2	
Steel plank 0.32 x 4.14 m – U	e491440	29.6	
Steel plank 0.32 x 0.73 m – U	e491607	6.4	
Steel plank 0.32 x 1.09 m – U	e491610	8.5	
Steel plank 0.32 x 1.57 m – U	e491615	11.2	
Steel plank 0.32 x 2.07 m – U	e491620	14.0	
Steel plank 0.32 x 2.57 m – U	e491625	15.9	
Steel plank 0.32 x 3.07 m – U	e491630	18.5	








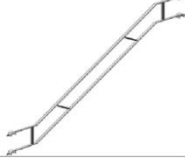
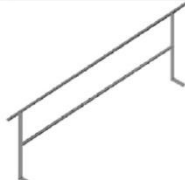



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Element name	Index	Weight	
Steel plank 0.32 x 0.73 m – O with crossbeam	e495507	6.8	
Steel plank 0.32 x 1.09 m – O with crossbeam	e495510	9.2	
Steel plank 0.32 x 1.57 m – O with crossbeam	e495515	12.7	
Steel plank 0.32 x 2.07 m – O with crossbeam	e495520	16.1	
Steel plank 0.32 x 2.57 m – O with crossbeam	e495525	19.5	
Steel plank 0.32 x 3.07 m – O with crossbeam	e495530	22.8	
Steel plank 0.32 x 0.73 m – O with crossbeam	e495507c	6.5	
Steel plank 0.32 x 1.09 m – O with crossbeam	e495510c	9.2	
Steel plank 0.32 x 1.57 m – O with crossbeam	e495515c	12.0	
Steel plank 0.32 x 2.07 m – O with crossbeam	e495520c	15.1	
Steel plank 0.32 x 2.57 m – O with crossbeam	e495525c	18.3	
Steel plank 0.32 x 3.07 m – O with crossbeam	e495530c	21.4	
Steel plank 0.32 x 0.73 m – O	e495607	6.6	
Steel plank 0.32 x 1.09 m – O	e495610	9.0	
Steel plank 0.32 x 1.57 m – O	e495615	12.3	
Steel plank 0.32 x 2.07 m – O	e495620	15.7	
Steel plank 0.32 x 2.57 m – O	e495625	19.1	
Steel plank 0.32 x 3.07 m – O	e495630	22.4	
Steel plank 0.32 x 0.73 m – O	e495607c	6.3	
Steel plank 0.32 x 1.09 m – O	e495610c	8.5	
Steel plank 0.32 x 1.57 m – O	e495615c	11.6	
Steel plank 0.32 x 2.07 m – O	e495620c	14.7	
Steel plank 0.32 x 2.57 m – O	e495625c	17.9	
Steel plank 0.32 x 3.07 m – O	e495630c	21.0	
Alu-plywood platform 0.61 x 1.09 m – U	e491110	10.7	
Alu-plywood platform 0.61 x 1.57 m – U	e491115	13.8	
Alu-plywood platform 0.61 x 2.07 m – U	e491120	17.0	
Alu-plywood platform 0.61 x 2.57 m – U	e491125	19.9	
Alu-plywood platform 0.61 x 3.07 m – U	e491130	23.0	
Alu-plywood pass-by platform 0.61 x 2.57 m – U	e492325	26.8	
Alu-plywood pass-by platform 0.61 x 3.07 m – U	e492330	29.7	
Pass-by alu. platform 0.61 x 2.07 m – O	e492620	20.3	
Pass-by alu. platform 0.61 x 2.57 m – O	e492625	28.1	
Pass-by alu. platform 0.61 x 3.07 m – O	e492630	31.0	
Pass-by alu. platform 0.61 x 1.57 m – U (no ladder)	e492515	16.2	
Pass-by alu. platform 0.61 x 2.07 m – U (no ladder)	e492520	19.4	
Pass-by alu. platform 0.61 x 2.57 m – U (no ladder)	e492525	22.3	
Pass-by alu. platform 0.61 x 3.07 m – U (no ladder)	e492530	25.2	
Inter-storey ladder 0.32 x 2.14 m	e511600	11.1	
Aluminium ladder (for platforms e4925....)	e492600	4.26	
Ladder's bolt	e492603	0.3	
Steel plank intermediate 0.3 x 1.5 m	e494015	9.9	
Steel plank intermediate 0.3 x 2.0 m	e494020	12.9	
Steel plank intermediate 0.3 x 2.5 m	e494025	16.0	
Steel plank intermediate 0.3 x 3.0 m	e494030	19.0	

















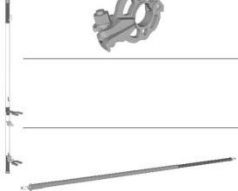
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Element name	Index	Weight	
Steel plank intermediate 0.3 x 1.0 with protection	e494110	7.0	
Steel plank intermediate 0.3 x 1.5 with protection	e494115	10.0	
Steel plank intermediate 0.3 x 2.0 with protection	e494120	13.0	
Steel plank intermediate 0.19 x 1.0 with protection	e494210	5.2	
Steel plank intermediate 0.19 x 1.5 with protection	e494215	7.6	
Steel plank intermediate 0.19 x 2.0 with protection	e494220	10.1	
Standard, steel footing	e511200	1.3	
Base jack 0.4 m	e511204	3.4	
Base jack 0.6 m	e511206	4.4	
Base jack 0.8 m	e511208	5.3	
Base jack 0.73 m	e511307	4.3	
Base jack 1.5 m	e511313	9.8	
Tilt base jack 0.8 m	e511408	7.9	
Tilt base jack 1.1 m	e511411	9.5	
Threaded head 0.6 m	e642200	5.3	
Threaded cross head 0.6 m	e642210	8.1	
Steel bracket 0.73 m – O	e373707	7.7	
Steel bracket 0.36 m – U	e374103	4.4	
Steel bracket 0.50 m – U	e374105	5.0	
Steel bracket 0.73 m – U	e374107	6.5	
Steel bracket 1.09 m – U	e374110	13.4	
Diagonal 1.77 m	e285179	8.2	
Diagonal 1.95 m	e285119	8.8	
Protective roof bracket 0.73 m	e288501	6.0	
Steel girder 0.5 x 2.57 m – U	e376725	29.6	
Steel girder 0.5 x 3.07 m – U	e376730	34.7	
Steel girder 0.5 x 5.14 m – U	e376751	56.0	
Steel girder 0.5 x 6.14 m – U	e376761	65.9	
Steel girder 0.5 x 5.14 m – O	e376851	59.9	
Steel girder 0.5 x 6.14 m – O	e376861	63.7	
Lattice alu girder 0.4 x 3.0 m	e501230	12.7	
Lattice alu. girder 0.4 x 4.0 m	e501240	17.0	
Lattice alu. girder 0.4 x 5.24 m	e501252	20.9	
Lattice alu. girder 0.4 x 6.0 m	e501260	24.7	
Lattice alu. girder 0.4 x 6.24 m	e501262	25.1	
Lattice alu. girder 0.5 x 3.24 m	e501330	14.9	
Lattice alu. girder 0.5 x 4.24 m	e501340	18.8	
Lattice alu. girder 0.5 x 5.24 m	e501350	22.6	
Lattice alu. girder 0.5 x 6.24 m	e501360	26.4	
Lattice alu. girder 0.4 x 2.0 m	e503320	21.1	
Steel girder 0.4 x 3.0 m	e503330	30.6	
Steel girder 0.4 x 4.0 m	e503340	41.3	
Steel girder 0.4 x 6.0 m	e503360	60.3	
Steel girder 0.5 x 3.24 m	e503230	36.4	
Steel girder 0.5 x 4.24 m	e503240	45.6	
Steel girder 0.5 x 5.24 m	e503250	54.8	
Steel girder 0.5 x 6.24 m	e503260	64.8	
Steel girder 0.4 x 5.14 m	e287754	56.0	
Steel girder 0.4 x 6.14 m	e287761	62.6	
Steel girder 0.4 x 6.14 m –pass by	e287762	62.1	

ROTAX Plus POLE SCAFFOLDING – ASSEMBLY MANUAL

Element name	Index	Weight	
Steel girder roof 0.4 m (short)	e502140	8.7	
Steel girder roof 0.4 m (long)	e502240	30.19	
Alu. crosshead 0.6 m	e501006	2.7	
Alu. crosshead 0.9 m	e501009	3.3	
Alu. crosshead 1.2 m	e501012	3.8	
Alu. crosshead 1.6 m	e501016	5.2	
Alu. crosshead 1.9 m	e501019	5.8	
Alu. crosshead 3.0 m	e501030	8.5	
Alu. crosshead 4.0 m	e501040	10.2	
Alu. crosshead 5.0 m	e501050	12.7	
Alu. crosshead 6.0 m	e501060	15.2	
Girder connector with fasteners L = 0.4 m	e502000	2.2	
Pass-by girder transom 0.73 m	e503407	2.8	
Alu. stairs 2.57 m	e286225	25.1	
Alu. stairs 3.07 m	e286230	29.9	
Transverse U-transom 0.36 m	e372403	1.9	
Transverse U-transom 0.73 m	e372407	3.1	
Stairs' external railing 2.0 x 2.57 m	e374925	18.6	
Stairs' external railing 2.0 x 3.07 m	e374930	20.6	
Stairs' internal railing 2.0 x 3.0 m	e286300	12.8	
Railing's grip	e374800	0.9	
Wall tie 0.4 m	e286504	1.6	
Wall tie 0.5 m	e286505	1.9	
Wall tie 0.8 m	e286508	2.9	
Wall tie 1.1 m	e286511	3.9	
Wall tie 1.3 m	e286513	4.5	
Wall tie 1.5 m	e286515	5.2	
Wall tie 1.9 m	e286519	6.5	
Girder pipe connector with fasteners	e376700	1.8	

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Element name	Index	Weight	
Pipe coupler	e581701	1.6	
Alu. overpass 4.25 m	e491042	32.7	
Alu. overpass 5.2 m	e491052	39.0	
Alu. overpass 6.1 m	e491061	46.0	
Alu. overpass 7.1 m	e491071	52.5	
Alu. post for railing	e491001	2.5	
Railing clamp	e491002	0.3	
Clamp for alu. gang-board	e491003	0.3	
Transport beam	e571173	26.3	
Footing with two nuts	e571175	4.1	
Castor Ø 200 mm	MP-116	4.6	
Anchor eye-bolt 0.12 m	e511012	0.2	
Anchor eye-bolt 0.19 m	e511019	0.3	
Anchor eye-bolt 0.23 m	e511023	0.4	
Normal coupling	e581119	0.8	
Rotary coupling	e581319	1.9	
Anchor coupling	e284610	0.9	
In-line coupling	e581419	1.5	
Wedge coupling normal	e373901	1.2	
Wedge coupling rotary	e373001	1.2	
Rosette clamp	e371200	1.1	
Assembly post	e206600	6.3	
Telescopic railing 1.5 m – 2.07 m	e206800	3.45	
Telescopic railing 2.07 m – 3.7 m	e206700	4.23	

ROTAX Plus POLE SCAFFOLDING – ASSEMBLY MANUAL

SCAFFOLDING COMMISSION PROTOCOL

- 1 Protocol reg. no.
.....
- 2 Scaffolding acceptance date
.....
- 3 Scaffolding assembly contractor
.....
..... tel.
- 4 Scaffolding user (Assembly ordering party)
.....
5. Scaffolding's technical overview:
 - type/model
.....
 - scaffolding parameters
.....
 - place of assembly
.....
 - working platforms' permissible load
.....
 - special equipment
.....
 - ground's resistance (grounding)
.....
 - dates for subsequent scaffolding inspections
.....
 - scaffolding appropriation
.....

DECLARATION AND CONFIRMATION

1 Assembly contractor certifies that the scaffolding described in this protocol is complete. The scaffolding was assembled with accordance to the rules of building and assembly manual provided by the manufacturer, as well as to the rules of OHS. The assembly was performed by certified fitters.

7. With this protocol, the Assembly contractor delivers as follows: a) scaffolding scheme
- b) scaffolding assembly manual
- c)
- d)

Scaffolding user accepts the scaffolding for exploitation without reservation and declares that is aware of

the rules of use resulting from the assembly manual instructions.

Commission composed of below mentioned confirms the scaffolding hand-over after assembly and commission to use.

2 Commission members:

- a)
- User b)
- User c)
- Contractor

Name position signature Application date for scaffolding

disassembly:..... Changes in the scaffolding

structure can only be performed by Assembly contractor. Check scaffolding's technical condition and completeness during its use.